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INTERACTIONAL AERODYNAMICS OF THE SINGLE ROTOR HELICOPTER CONF--ETC(U)

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DAAJ02-77-C-0020

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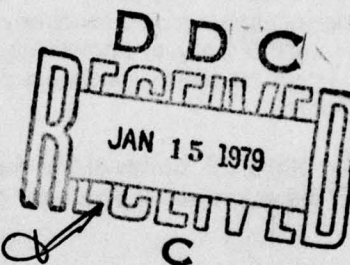
6 **INTERACTIONAL AERODYNAMICS OF THE SINGLE ROTOR HELICOPTER CONFIGURATION.**

VOLUME IV-F. One-Third Octave Band Spectrograms of Wake Split-Film Data, Air Ejectors With Hubcaps; Wings.

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11
Sep 78

12 232 p.

13
Final Report for Period March 1977 - February 1978,

15 DAAJ02-77-C-p020

Approved for public release;
distribution unlimited.

16 16262209AH76

17 PP

Prepared for

APPLIED TECHNOLOGY LABORATORY

U. S. ARMY RESEARCH AND TECHNOLOGY LABORATORIES (AVRADCOM)

Fort Eustis, Va. 23604

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APPLIED TECHNOLOGY LABORATORY POSITION STATEMENT

In 1975 a wind tunnel test program was conducted in the Boeing-Vertol 20-foot V/STOL Wind Tunnel on a 1/5th-scale UTTAS model to investigate and find solutions for several aerodynamic problems encountered during the UTTAS flight-testing. Specifically, these tests focused upon (a) the structure of the hub/rotor wake in the vicinity of the empennage, (b) the formulation of the ground vortex and its relation to hub loads and fuselage loads during transition, and (c) the occurrence of vibratory air pressures from the blade passing over the fuselage. Only portions of the above-mentioned wind tunnel test data were reduced and analyzed in addressing the flight-test problems of the UTTAS aircraft.

Under Contract DAAJ02-77-C-0020, Boeing-Vertol completed analyses on the data to understand more completely the aerodynamic interactions that are involved and to formulate instructions for the guidance of designers in these respects. The results of these studies are applicable to all existing and future single-rotor/tail rotor helicopters. The data have been segregated according to aerodynamic interactions and associated phenomena/problem areas. From this body of knowledge, a generalized set of design guidelines meaningful to the single-rotor helicopter design concept formulation were developed and are included in these reports.

Mr. Robert P. Smith of the Aeronautical Technology Division, Aeromechanics Technical Area, served as project engineer for this effort.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER USARTL TR-78-23D	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) INTERACTIONAL AERODYNAMICS OF THE SINGLE ROTOR HELICOPTER CONFIGURATION, Volume IV, One-Third Octave Band Spectrograms of Wake Split-Film Data, Sub-Volume F, Air Ejectors With Hubcaps; Wings		5. TYPE OF REPORT & PERIOD COVERED FINAL REPORT 15 Mar 1977 - 13 Feb 1978
7. AUTHOR(s) Philip F. Sheridan		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS Boeing Vertol Company P.O. Box 16858 Philadelphia, Pa. 19142		8. CONTRACT OR GRANT NUMBER(s) DAAJ02-77-C-0020
11. CONTROLLING OFFICE NAME AND ADDRESS Applied Technology Laboratory, U.S. Army Research and Technology Laboratories (AVRADCOM) Fort Eustis, Virginia 23604		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 62209A 1L262209AH76 00 189 EK
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE September 1978
		13. NUMBER OF PAGES 231
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES Volume IV of an eight-volume report Volume IV is comprised of seven sub-volumes (A thru G)		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)		
Wake Flow Interaction Aerodynamic Interaction	Flow Environment Configuration Empennage Flow Modifier	Air Ejector Hub Cap Wings Powered Model
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This is the sixth of the seven sub-volumes of Volume IV containing one-third octave band spectrographs of the model helicopter hub/rotor wake as it was modified by various aerodynamic devices. This sub-volume deals with the effects of air ejector systems in configurations already possessing hub caps and also of several wing configurations mounted variously to alter the wake.		

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PREFACE

The entire report describing the investigation of **INTERACTIONAL AERODYNAMICS OF THE SINGLE-ROTOR HELICOPTER CONFIGURATION** comprises eight numbered volumes bound as 33 separate documents. The complete list of these documents is as follows:

Volume I, Final Report

Volume II, Harmonic Analyses of Airframe Surface Pressure Data

- A — Runs 7-14, Forward Section
- B — Runs 7-14, Mid Section
- C — Runs 7-14, Aft Section
- D — Runs 15-22, Forward Section
- E — Runs 15-22, Mid Section
- F — Runs 15-22, Aft Section
- G — Runs 23-33, Forward Section
- H — Runs 23-33, Mid Section
- I — Runs 23-33, Aft Section

Volume III, Flow Angle and Velocity Wake Profiles in Low-Frequency Band

- A — Basic Investigations and Hubcap Variations
- B — Air Ejector Systems and Other Devices

Volume IV, One-Third Octave Band Spectrograms of Wake Split-Film Data

- A — Buildup to Baseline
- B — Basic Configuration Wake Explorations
- C — Solid Hubcaps
- D — Open Hubcaps
- E — Air Ejectors
- F — Air Ejectors With Hubcaps; Wings
- G — Fairings and Surface Devices

This volume is

Volume V, Harmonic Analyses of Hub Wake

Volume VI, One-Third Octave Band Spectrograms of Wake Single Film Data

- A — Buildup to Baseline
- B — Basic Configuration Wake Exploration
- C — Hubcaps and Air Ejectors

Volume VII, Frequency Analyses of Wake Split-Film Data

- A — Buildup to Baseline
- B — Basic Configuration Wake Explorations
- C — Solid Hubcaps

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- D - Open Hubcaps
- E - Air Ejectors
- F - Air Ejectors With Hubcaps; Wings
- G - Fairings and Surface Devices

Volume VIII, Frequency Analyses of Wake Single Film Data

- A - Buildup to Baseline
- B - Basic Configuration Wake Exploration
- C - Hubcaps and Air Ejectors

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INTRODUCTION

Volume IV presents spectrograms of the flow angles and velocity components for each run and its test points. Specifically, these machine plots show the root mean square value of each wake parameter over discrete frequency intervals one-third of an octave band in width. The octave arrangement is selected to provide 19 spectral increments from 3.9 to 250.0 Hz centerband frequency. A special computer program is employed to derive wake parameters within these bands consistent with corresponding basic spectral functions depicted in Volume VII.

The graphs showing the one-third octave band values are sequenced in the same order as the Outline of Wake Investigations (Table 1). These graphs are distributed among Volumes IV-A through IV-G by the major categories of Table I in the following arrangement:

Volume IV-A	Build-up to Baseline
Volume IV-B	Basic Configuration
Volume IV-C	Effect of Hub Caps Section 1 & 2
Volume IV-D	Effect of Hub Caps Section 3 & 4
Volume IV-E	Effect of Hub Caps Section 5 and Effect of Air Ejectors
Volume IV-F	Air Ejectors with Open Hub Caps and Effect of Wings and Misc. Section
Volume IV-G	Effect of Wings and Misc. Sections 2 and 3

The Table I outline-and other material is included for reference and as a context to the work of each sub-volume. Table 2, the List of Test Runs, arranges the runs in numerical order and gives pertinent text parameters.

The Index of Rake Positions, Table 3, lists the hot film transducer rake positions in the model coordinate system for each run and its test points. The main feature of Table 3 is the indexing of the test point number to the model waterline station and butt line as it varied from run to run. The table groups the runs as they shared the indexing correspondence of point with position. It is emphasized that the runs in a group do not necessarily all share the same number of test points but they do have same correspondence within their respective ranges of test points.

The orientation of the rake is shown pictorially in Figures 1 through 6 for the various test runs. Figure 7 presents a scaled drawing of the model with reference to the three-axis coordinate system. Table 4 lists the center frequency and the upper and lower band limits for each of the numbered one-third octave bands.

TABLE 1			
OUTLINE OF WAKE INVESTIGATIONS			
Description	Configuration Code	Run No.	Base-line
<u>Build-up to Baseline</u>			
1. Nacelles removed	$K_{13}+H_1-N$	149	150
2. Blades off, rotating hub	$K_{13}-M+H_{1.0}$	160	156
3. " " , non-rotating hub	$K_{13}-M+H_{1.0}$	158	156
4. " " , hub off	$K_{13}-M-H_{1.0}$	159	156
<u>Basic Configuration</u>			
<u>1. Wake Explorations near Empennage</u>			
(a) 15" Long. + traverse at T/R C.L.	K_{11}	111	---
(b) 9" Vert. + " above T/R "	"	112	---
(c) 2" " " in vortex	"	113	---
(d) 8" " " (continue 112)	"	114	---
(e) 13" " " behind stab.	"	115	---
(f) Lateral traverse, left stab. (One T.P. only)	"	116	---
(g) Same continued	"	117	---
(h) Same continued (One T.P. only)	"	118	---
(i) Lateral traverse right stab.	"	119	---
(j) T/R effect on wake	$K_{11}+T_2^0$	121	115
<u>2. Climb/Descent Studies</u>			
(a) Climb 900 FPM	K_{11}	135	---
(b) Descent 800 FPM	"	136	---
<u>Effect Of Hub Caps</u>			
<u>1. Solid Caps on Canister</u>			
(a) 7.6" diam. 2.17" ht. soft Pitch Arms	$K_{11}-H_{1.0}+H_{1.2}$	137	136
(b) 7.6" diam. 2.17" ht. stiff Pitch Arms	$K_{13}+H_{1.2}$	153	156
(b) 7.6" diam. 2.45" ht. flt. test config.	$K_{13}+H_{1.2.1}+I_1$ $+E_{1.0}$	207	188

TABLE 1 (CONTINUED)

OUTLINE OF WAKE INVESTIGATIONS

Description	Configuration Code*	Run No.	Base-line
<u>Effect of Hub Caps (Continued)</u>			
<u>2. Solid Caps Raised Above Canister</u>			
(a) 7.6" diam. 2.45" ht. 70" depth, .55 gap	$H_{1.2.2} + I_1 + E_{1.0}$	208	188
(b) 10.0" diam. 3.25" ht. 1.55" depth, .50" gap	$H_{1.8.1} + I_1 + E_{1.0}$	189	188
(c) 10.0" diam. 4.125" ht. 2.05" depth, .875" gap	$H_{1.8.2} + I_1 + E_{1.0}$	190	188
(d) Repeat of 189	" " "	210	188
<u>3. Open Caps Without Underbody</u>			
(a) 10.0" diam. 1.25" gap, blades	$H_{1.0.2} + I_1 + E_{1.0}$	193	188/166
(b) " " " gap, no blades	$H_{1.0.1} - M$	166	158
(c) " " 2.05" gap, blades	$H_{1.14.1} + I_1 + E_{1.0}$	211	188
(d) " " 1.75" gap, no blades	$H_{1.0.1} - M$	165	158
(e) " " 1.87" gap, blades	$H_{1.0.3} + I_1 + E_{1.0}$	191	188
(f) 16" diam. 2.00" gap, blades	$H_{1.7.1}$	168	156/167
(g) " " " gap, no blades	$H_{1.7.1} - M$	167	158
(h) " " 4.00" gap, blades	$H_{1.7.2}$	169	156
<u>4. Open Caps with Underbody</u>			
(a) 7.6" diam. 1.25" gap	$H_{1.11.1} + I_2 + E_{1.0}$	194	188
(b) " " " " "	$H_{1.11.1} + I_2 + E_{4.0}$	198	188
(c) " " " " center post	$H_{1.11.2} + I_2$	202	194
(d) 10.0" diam. .5" gap, no blades	$H_{1.5.1} - M$	164	158
(e) " " 1.25" gap, no blades	$H_{1.5.2} - M$	161	158
(f) " " 2.0" gap, no blades	$H_{1.5.4} - M$	163	158
(g) " " 4.0" gap, no blades	$H_{1.5.3} - M$	162	158
(h) " " 1.25" gap	$H_{1.5.2}$	154	156/161
*Basic Code is K13.			

TABLE 1 (CONTINUED)

OUTLINE OF WAKE INVESTIGATIONS

Description	Configuration Code*	Run No.	Base-line
<u>5. Miscellaneous Hub Covers</u>			
(a) Hub fairing 16" diam.	H _{1.3}	151	150
(b) Wham-O-Frisbee 10" diam.	H _{1.9.0} +E _{1.2}	182	181
(c) Fab. glass Frisbee 16" diam.	H _{1.9.1} +E _{1.2}	183	181
<u>Effect of Air Ejectors</u>			
1. Basic system no blowing	H _{1.0} +E _{1.0}	172	156
2. " " 40 psi	" "	173	156/172
3. " " 150 psi	" "	174	156/172
4. Wide chord shroud 40 psi	H _{1.0} +E _{2.5.1}	175	156/173
5. Wide " " 150 psi	" "	176	156/174
6. W/C shroud w. lip 40 psi	H _{1.0} +E _{3.5.2}	184	156/173
7. Same Contoured Parallel 150 psi	H _{1.0} +E _{3.5.4}	187	156/174
8. Bifurcated duct 0 psi	H _{1.0} +E _{5.0}	203	156
9. " " 40 psi	" "	204	156/203
10. " " 150 psi	" "	205	156/203
<u>Air Ejectors with Open Hub Caps with Underbodies</u>			
1. 7.6" diam. 1.25" gap, 0 psi	H _{1.11.1} +I ₂ +E _{1.0}	194	188/172
2. " " " " 20 psi	" " "	195	188
3. " " " " 40 psi	" " "	196	188/173
4. " " " " 150 psi	" " "	197	188/174
5. " " " " 0 psi	H _{1.11.1} +I ₂ +E _{4.0}	198	188/194
6. " " " " 40 psi	" " "	199	188/196
7. " " " " 150 psi	" " "	200	188/196
8. Same with center post	H _{1.11.2} +I ₂ +E _{4.6}	201	188/200
9. 10.0" diam. 2.0" gap wide ch'd. shroud (150 psi)	H _{1.5.4} +E _{2.5.1}	177	156/176
<u>Effect of Wings and Misc.</u>			
1. Wings			
(a) Nacelle-mounted stub wing	H _{1.0} +W _{1.0} +E _{1.1}	178	181
(b) Single slotted flapped wing	H _{1.0} +W _{3.0} +E _{1.0}	180	181
(c) Double slotted flapped wing	H _{1.0} +W _{2.0} +E _{1.0}	179	181
(d) Boom-mounted stub wing	H _{1.0} +W _{4.0}	186	156
*Basic Code is K13.			

TABLE 1 (CONTINUED)

OUTLINE OF WAKE INVESTIGATIONS

Description	Configuration Code*	Run No.	Base-line
2. Crown Fairings			
(a) Flat top behind shaft	K ₁₁ +D ₁	140	138
(b) Round top behind shaft	K ₁₁ +D ₂	141	138
(c) Extended flat top fairing	H ₁ +D ₄	170	156
(d) Flat top + 16" cap, 4" gap	H ₁₋₇₋₂ +D ₄	171	170
(e) Forward fairing/nacelle fairing	P ₁₋₀	152	156
3. Surface Devices			
(a) Vortex generators	K ₁₁ +VG ₂₋₁	139	138
(b) Guidevane between nacelles	K ₁₁ +FV ₁	142	138
(c) Longitudinal strakes	H ₁₋₅₋₃ +S ₄	155	156
(d) 14% porosity spoiler	K ₁₁ +X ₁	143	138

*Basic Code is K13 unless noted otherwise.

TABLE 2
LIST OF TEST RUNS
BASIC INVESTIGATIONS OF THE HUB WAKE

RUN NO.	CONFIGURATION/CONDITION	V _{TUN} KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES		MR HT. h/d	TAIL ROTOR
					α°	ψ°		
111	K ₁₁ /15" Long. wake traverse at TR center line	80	1433/0	8	6.0	-2.0	∞	Off
112	" /9" Vert. wake traverse above TR center line	"	"	"	"	"	"	"
113	" /2" Vert traverse through MR vortex	"	"	"	"	"	"	"
114	" /8" Vert. traverse below TR center line	"	"	"	"	"	"	"
115	" /13" Vert. traverse behind stabilizer	"	"	"	"	"	"	"
116	" /Lateral traverse - left stabilizer	"	"	"	"	"	"	"
117	" /116 continued	"	"	"	"	"	"	"
118	" /116 continued	"	"	"	"	"	"	"
119	" /Lateral traverse - right stabilizer	"	"	"	"	"	"	"
121	K ₁₁ +T ₂ /Effect of tail rotor flow on wake	"	1433/4500	"	"	"	"	On
135	K ₁₁ /Wake in 900 fpm climb	"	"	"	-6.0	-4.5	"	Off
136	" /Wake in 800 fpm descent	"	"	"	6.0	-2.0	"	"

TABLE 2 (CONTINUED)
LIST OF TEST RUNS
EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	VTUN KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES		MR HT. h/d	TAIL ROTOR
					α°	ψ°		
137	K ₁₁ -H _{1.0} +H _{1.2} /Effect of 7.6 inch diam. solid hub cap	80	1433/0	8	6	-3.8	∞	Off
138	K ₁₁ /Repeat of base run	"	"	"	"	"	"	"
139	K ₁₁ +VG2.1/Effect of vortex generators on aft crown	"	"	"	"	"	"	"
140	K ₁₁ +D ₁ /Flat-topped "doghouse" fairing on aft crown	"	"	"	"	"	"	"
141	K ₁₁ +D ₂ /Rounded-top fairing	"	"	"	"	"	"	"
142	K ₁₁ +FV ₁ /Deflection vane on crown between nacelles	"	"	"	"	"	"	"
143	K ₁₁ +X ₁ /Variable porosity spoiler	"	"	"	"	"	"	"
149	K ₁₃ +H ₁ -N ₁ /Effect of nacelles off also add stiff pitch arms (K ₁₃)	60	1075/0	4.5	"	"	"	"
150	K ₁₃ +H ₁ /60 knot baseline	"	"	"	"	"	"	"
151	K ₁₃ +H _{1.3} /16 inch diam. helmet fairing	"	"	"	"	"	"	"
152	K ₁₃ +P _{1.0} /Pylon and intake fairings	80	1433/0	8	"	"	"	"
153	K ₁₃ +H _{1.2} /Repeat 137 with K ₁₃ pitch arms	"	"	"	"	"	"	"

TABLE 2 (CONTINUED)

LIST OF TEST RUNS

EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	V _{TUN} KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES		MR HT. h/d	TAIL ROTOR
					α°	ψ°		
154	K ₁₃ +H _{1.5.2/10} " open hub cap, 7" underbody, 1.25" gap	80	1433/0	8	6	-3.8	∞	Off
155	K ₁₃ +H _{1.5.2} +S ₄ /Same as 154 except strakes on aft crown	"	"	"	"	"	"	"
156	K ₁₃ +H _{1.0} /Baseline with K ₁₃ , i.e., stiff pitch arms	"	"	"	"	"	"	"
158	K ₁₃ -M+H _{1.0} /Wake studies with blades off, hub not rotating	"	0/0	"	"	"	"	"
159	K ₁₃ -M-H _{1.0} /Wake studies with hub off	"	"	"	"	"	"	"
160	K ₁₃ -M+H _{1.0} /Same as 158 except hub is rotating	"	1433/0	"	"	"	"	"
161	K ₁₃ -M+H _{1.5.2} /Repeat of 154 without blades	"	0/0	"	"	"	"	"
162	K ₁₃ -M+H _{1.5.3} /Same as 161 except 4" gap	"	"	"	"	"	"	"
163	K ₁₃ -M+H _{1.5.4} /Same as 161 except 2" gap	"	"	"	"	"	"	"
164	K ₁₃ -M+H _{1.5.1} /Same as 161 except 0.5" gap	"	"	"	"	"	"	"
165	K ₁₃ -M+H _{1.0.1/10} " open hub cap, no underbody, same cap vert. position as Run 154	"	"	"	"	"	"	"
166	K ₁₃ -M+H _{1.0.2} /Same as 165 with cap lowered by 0.5"	"	"	"	"	"	"	"

TABLE 2 (CONTINUED)
LIST OF TEST RUNS
EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	VTUN KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES		MR HT.	TAIL ROTOR
					α°	ψ°		
167	K ₁₃ -M+H _{1.7.1/16} " open cap, no underbody, 2" gap	80	0/0	8	6	-3.8	∞	Off
168	K ₁₃ +H _{1.7.1/16} " Blades on, same cap config. as 167	"	1433/0	"	"	"	"	"
169	K ₁₃ +H _{1.7.2/16} " open cap, no underbody, 4" gap	"	"	"	"	"	"	"
170	K ₁₃ +H _{1.0+D4.0/Extended flat top fairing on aft crown}	"	"	"	"	"	"	"
171	K ₁₃ +H _{1.7.2+D4.0/Same fairing as 170, same cap as 169}	"	"	"	"	"	"	"
172	K ₁₃ +H _{1.0+E1.0(0psi)/Basic air ejector zero blowing baseline}	"	"	"	"	"	"	"
173	K ₁₃ +H _{1.0+E1.0(40 psi)/Same as 172 with 40 psi supply}	"	"	"	"	"	"	"
174	K ₁₃ +H _{1.0+E1.0(150 psi)/Same as 172 with 150 psi supply}	"	"	"	"	"	"	"
175	K ₁₃ +H _{1.0+E2.5.1(40 psi)/Ejector with wide chord shroud at 40 psi}	"	"	"	"	"	"	"
176	K ₁₃ +H _{1.0+E2.5.1(150 psi)/Same as 174 with 150 psi supply}	"	"	"	"	"	"	"
177	K ₁₃ +H _{1.5.4+E2.5.1(150 psi)/Same as 176 with 10" cap like 163}	"	"	"	"	"	"	"
178	K ₁₃ +H _{1.0+W1.0+E1.1(0 psi)/Nacelle mounted wing}	"	"	"	"	"	"	"

TABLE 2 (CONTINUED)

LIST OF TEST RUNS

EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	VTUN KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES		MR HT. h/d	TAIL ROTOR
					α°	ψ°		
179	K ₁₃ +H _{1.0} +W _{2.0} +E _{1.0} (0 psi)/Double slotted flapped wing	80	1433/0	8	6	-3.8	∞	Off
180	K ₁₃ +H _{1.0} +W _{3.0} +E _{1.0} (0 psi)/Single slotted flapped wing	"	"	"	"	"	"	"
181	K ₁₃ +H _{1.0} +E _{1.2} (0 psi)/Baseline with ejector tube moved aft	"	"	"	"	"	"	"
182	K ₁₃ +H _{1.9.0} +E _{1.2} (0 psi)/Standard 10" frisbee	"	"	"	"	"	"	"
183	K ₁₃ +H _{1.9.1} +E _{1.2} (0 psi)/16" fabricated frisbee	"	"	"	"	"	"	"
184	K ₁₃ +H _{1.0} +E _{3.5.2} (40 psi)/Wide chord with lip at 40 psi	"	"	"	"	"	"	"
185	K ₁₃ +H _{1.0} +E _{3.5.2} (150 psi)/Same as 184 with 150 psi air	"	"	"	"	"	"	"
186	K ₁₃ +H _{1.0} +W _{4.0} /Boom mounted stub wing	"	"	"	"	"	"	"
187	K ₁₃ +H _{1.0} +E _{3.5.4} (150 psi)/Like 185 with modified shroud	"	"	"	"	"	"	"
188	K ₁₃ +H _{1.0} +I ₁ +E _{1.0} (0 psi)/Baseline with I ₁ instr. ring	"	"	"	"	"	"	"
189	K ₁₃ +H _{1.8.1} +I ₁ +E _{1.0} (0 psi)/Solid cap, 10" diam. 3.25" height	"	"	"	"	"	"	"
190	K ₁₃ +H _{1.8.2} +I ₁ +E _{1.0} (0 psi)/Same as 190 except + 4.12" height	"	"	"	"	"	"	"

TABLE 2 (CONTINUED)
LIST OF TEST RUNS
EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	VTUN KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES		MR HT. h/d	TAIL ROTOR
					α°	ψ°		
191	K13+H1.0.2+I1+E1.0 (0 psi)/10" cap, no underbody, 1.87" gap	80	1433/0	8	6	-3.8	∞	Off
193	K13+H1.0.2+I1+E1.0 (0 psi)/10" cap, no underbody, 1.25" gap	"	"	"	"	"	"	"
194	K13+H1.11.1+I2+E1.0 (0 psi)/7.6" cap, underbody, 1.25" gap	"	"	"	"	"	"	"
195	K13+H1.11.1+I2+E1.0 (20 psi)/Same as 194 with 20 psi air	"	"	"	"	"	"	"
196	K13+H1.11.1+I2+E1.0 (40 psi)/Same as 194 with 40 psi air	"	"	"	"	"	"	"
197	K13+H1.11.1+I2+E1.0 (150 psi)/Same as 194 with 150 psi air	"	"	"	"	"	"	"
198	K13+H1.11.1+I2+E4.0 (0 psi)/Same as 194 except blowing tube 2" aft	"	"	"	"	"	"	"
199	K13+H1.11.1+I2+E4.0 (40 psi)/Same as 198 with 40 psi air	"	"	"	"	"	"	"
200	K13+H1.11.1+I2+E4.0 (150 psi)/Same as 198 with 150 psi air	"	"	"	"	"	"	"
201	K13+H1.11.2+I2+E4.0 (150 psi)/Same as 200 except center support cap	"	"	"	"	"	"	"
202	K13+H1.11.2+I2/Baseline with I2 and no blowing tube	"	"	"	"	"	"	"
203	K13+H1.0+E5.0 (0 psi)/Bifurcated air duct baseline	"	"	"	"	"	"	"

TABLE 2 (CONTINUED)

LIST OF TEST RUNS
EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	VTUN KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES		MR HT.	TAIL ROTOR
					α°	ψ°		
204	K13+H1.0+E5.0 (150 psi)/Bifurcated duct with 150 psi air	80	1433/0	8	6	-3.8	∞	Off
205	K13+H1.0+E5.0 (40 psi)/Same as 204 with 40 psi air	"	"	"	"	"	"	"
207	K13+H1.2.1+I1+E1.0 (0 psi)/7.6" solid cap, no gap	"	"	"	"	"	"	"
208	K13+H1.2.2+I1+E1.0 (0 psi)/Same as 207 except 0.55" gap	"	"	"	"	"	"	"
210	K13+H1.15.1+I1+E1.0 (0 psi)/Repeat of 189	"	"	"	"	"	"	"
211	K13+H1.14.1+I1+E1.0 (0 psi)/Like 189 and 210 except cap is open	"	"	"	"	"	"	"

TABLE 3					
INDEX TO RAKE POSITIONS					
RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
111	20	53.5	103.1	-7.25	1
	21	"	"	"	
	22	"	105.0	"	
	24	"	107.0	"	
	26	"	109.0	"	
	28	"	111.0	"	
	30	"	112.9	"	
	32	"	114.9	"	
	34	"	116.9	"	
	36	"	118.9	"	
112	2	48.9	107.3	-7.25	1
	4	50.8	"	"	
	6	52.7	103.3	"	
	8	54.5	"	"	
	10	56.2	"	"	
	12	57.2	"	"	
113	2	51.7	103.3	-3.25	1
	4	52.3	"	"	
	6	52.8	"	"	
	8	53.3	"	"	
	10	53.9	"	"	
	11	53.3	"	"	
114	2	44.5	103.0	-3.25	1
	4	46.4	"	"	
	6	48.2	"	"	
	8	50.0	"	"	
	10	51.9	"	"	
115	3	52.9	124.7	-3.25	1
	4	52.0	"	"	
	6	50.0	"	"	
	9	48.0	"	"	
	10	46.0	"	"	
	12	44.1	"	"	
	14	42.1	"	"	
	16	53.0	"	"	
	18	54.0	"	"	
	20	55.0	"	"	

TABLE 3 (CONTINUED)
INDEX TO RAKE POSITIONS

RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
116	7	36.9	100.5	-17.5	1
117	2	37.6	100.5	-16.0	1
	4	"	"	-14.0	
	6	37.3	99.6	-12.0	
	8	"	"	-10.0	
	10	"	"	- 8.0	
118	2	37.6	100.5	- 6.0	1
119	2	37.3	99.6	+ 6.0	1
	5	"	"	8	
	8	"	"	10	
	9	"	"	"	
	14	"	"	14	
	16	"	"	16	
	20	51.5	102.5	17.5	
	25	52.3	101.7	-17.5	
121	3	62.9	129.0	+ 5.7	2
	4	53.5	"	"	
	6	50.1	"	"	
	8	46.0	"	"	
	10	42.1	"	"	
135	2	56.9	106.3	- 5.7	3
	4	54.5	"	"	
	6	52.5	"	"	
	8	50.5	"	"	
	10	48.5	"	"	
	12	46.5	"	"	
136	14	44.5	"	"	4
	2	56.5	104.0	- 8.0	
	4	54.5	"	"	
	6	52.5	"	"	
	8	50.6	"	"	
	10	48.5	"	"	
	12	46.5	"	"	
	14	44.5	"	"	
	17	37.1	"	"	
	18	39.0	"	"	
	19	41.0	"	"	

TABLE 3 (CONTINUED)
INDEX TO RAKE POSITIONS

RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
137	3	38.7	98.4	- 8.0	5
	5	39.9	"	"	
	7	42.0	100.5	"	
	9	44.0	"	"	
	11	46.0	103.6	"	
	13	48.0	"	"	
	15	50.0	"	"	
	17	52.0	"	"	
	19	54.0	"	"	
138-41, 143	2	38.8	98.4	- 8.0	5
	3	40.0	"	"	
	4	42.0	100.5	"	
	5	44.0	"	"	
	6	46.0	103.6	"	
	7	48.0	"	"	
	8	50.0	"	"	
	9	52.0	"	"	
	10	54.0	"	"	
142	7	37.8	98.4	- 8.0	5
	8	"	"	"	
	9	40.2	"	"	
	10	42.0	100.5	"	
	11	44.0	"	"	
	12	46.0	103.6	"	
	13	48.0	"	"	
	14	50.0	"	"	
	15	52.0	"	"	
	16	54.0	"	"	
	17	56.8	"	"	

TABLE 3 (CONTINUED)
INDEX TO RAKE POSITIONS

RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
149-151	2	38.8	98.5	- 8.0	5
	3	40.0	"	"	
	4	42.0	100.6	"	
	5	44.0	"	"	
	6	46.0	103.5	"	
	7	48.0	"	"	
	8	50.0	"	"	
	9	52.0	"	"	
	10	54.0	"	"	
152-6, 158	2	42.9	97.9	0.0	6
161-4, 166	3	44.9	"	"	
167, 169-71	4	46.9	100.6	"	
175, 177-9	5	48.9	"	"	
180, 182, 184	6	50.9	104.6	"	
186-8, 190	7	52.9	"	"	
191, 193, 194	8	54.9	"	"	
196, 198, 201	9	56.9	"	"	
204, 207, 208					
211					
159	1	54.9	104.6	0.0	6
	2	52.9	"	"	
	3	50.7	"	"	
	4	48.6	100.6	"	
	5	46.7	"	"	
160, 203	5	42.9	97.9	0.0	6
	6	44.9	"	"	
	7	46.9	100.6	"	
	8	48.9	"	"	
	9	50.9	104.6	"	
	10	52.9	"	"	
	11	54.9	"	"	
165	3	44.9	97.9	0.0	6
	4	42.9	"	"	
	5	46.9	100.6	"	
	6	48.9	"	"	
	7	50.9	104.6	"	
	8	52.9	"	"	

TABLE 3 (CONTINUED)
INDEX TO RAKE POSITIONS

RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
168, 183	4	42.9	97.9	0.0	6
	5	44.9	"	"	
	6	46.9	100.6	"	
	7	48.9	"	"	
	8	50.9	104.6	"	
	9	52.9	"	"	
	10	54.9	"	"	
172	3	42.9	97.9	0.0	6
	4	44.9	"	"	
	6	44.9	"	"	
	7	46.9	100.6	"	
	8	48.9	"	"	
	9	50.9	104.6	"	
	10	52.9	"	"	
173, 174, 176 185, 195, 197 199, 200, 205 210	1	42.9	97.9	0.0	6
	2	44.9	"	"	
	3	46.9	100.6	"	
	4	48.9	"	"	
	5	50.9	104.6	"	
	6	52.9	"	"	
	7	54.9	"	"	
181	2	42.9	97.9	0.0	6
	3	44.9	"	"	
	4	46.9	100.6	"	
	5	48.9	"	"	
	6	50.9	104.6	"	
	7	52.9	"	"	
	9	54.9	"	"	
	10	"	"	"	
	11	"	"	"	
	12	"	"	"	
	13	42.9	97.9	"	

TABLE 3 (CONTINUED)
INDEX TO RAKE POSITIONS

RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
189	29	42.9	97.9	0.0	6
	30	44.9	"	"	
	31	46.9	100.6	"	
	32	48.9	"	"	
	33	"	"	"	
	34	50.9	104.6	"	
	35	"	"	"	
	36	48.9	100.6	"	
	37	50.9	104.6	"	
	38	52.9	"	"	
	39	54.9	"	"	
202	3	43.4	97.9	0.0	6
	4	44.9	"	"	
	5	46.9	100.6	"	
	6	48.9	"	"	
	7	50.9	104.6	"	

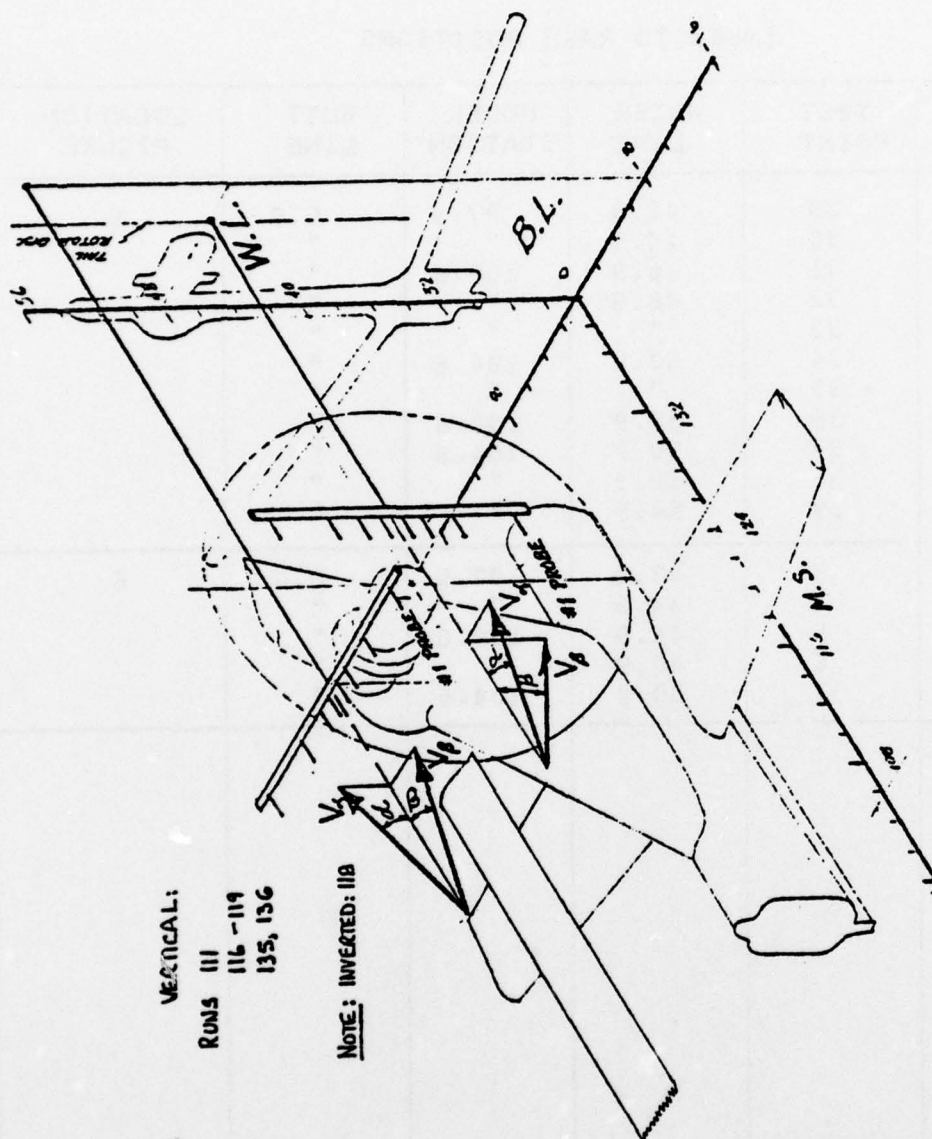


FIGURE 1 - RAKE ORIENTATION DIAGRAM

FIGURE 2 -HOT FILM RAKE LOCATIONS

RUN 135

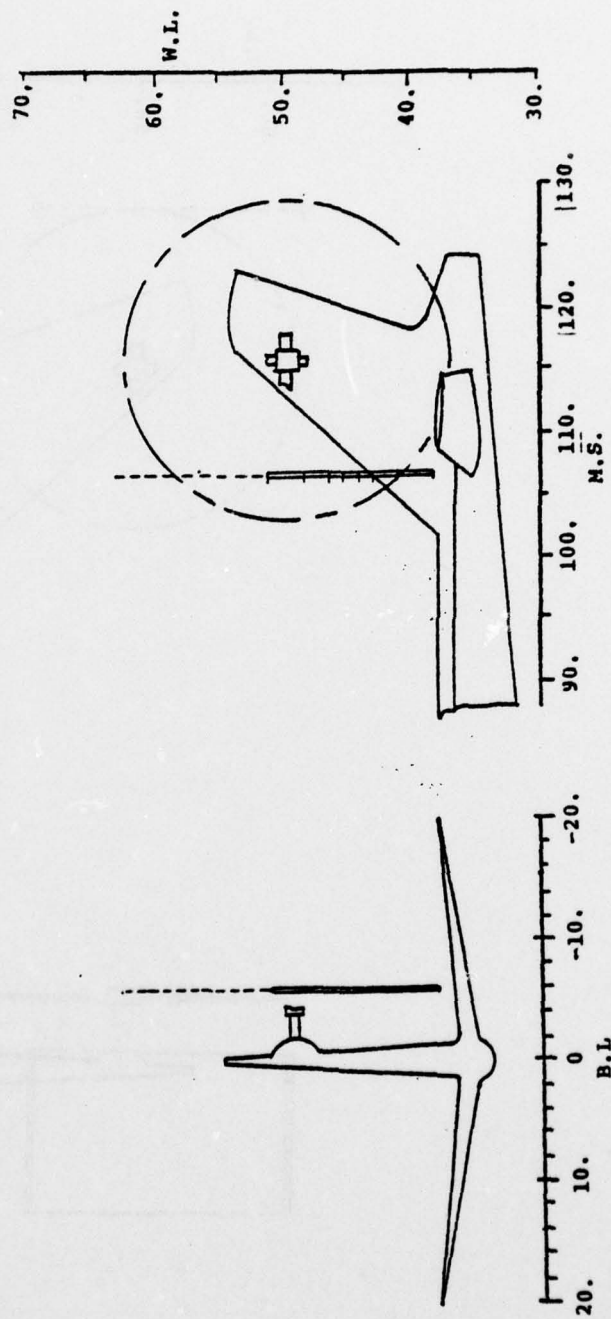


FIGURE 3 -HOT FILM RAKE LOCATIONS

RUN 136

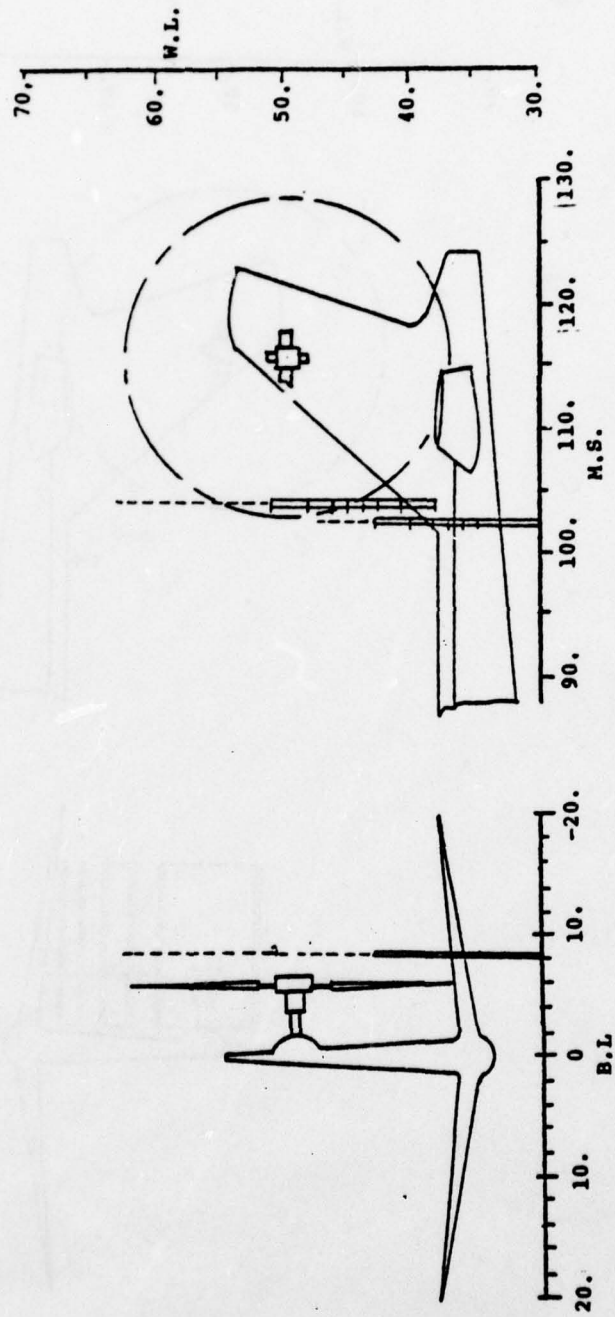


FIGURE 4 -HOT FILM RAKE LOCATIONS

RUN 137, 138, 139, 140, 141, 142,
143, 148, 149, 150, 151

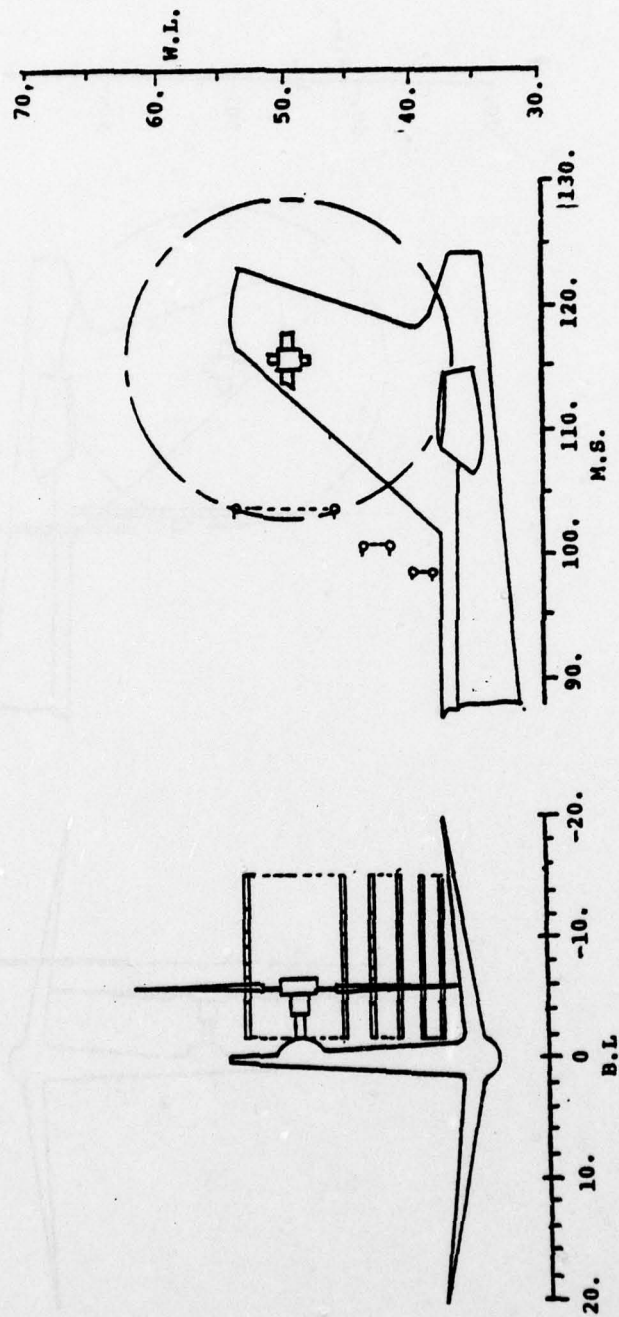


FIGURE 5 -HOT FILM RAKE LOCATIONS

RUN 152-156, 158-211

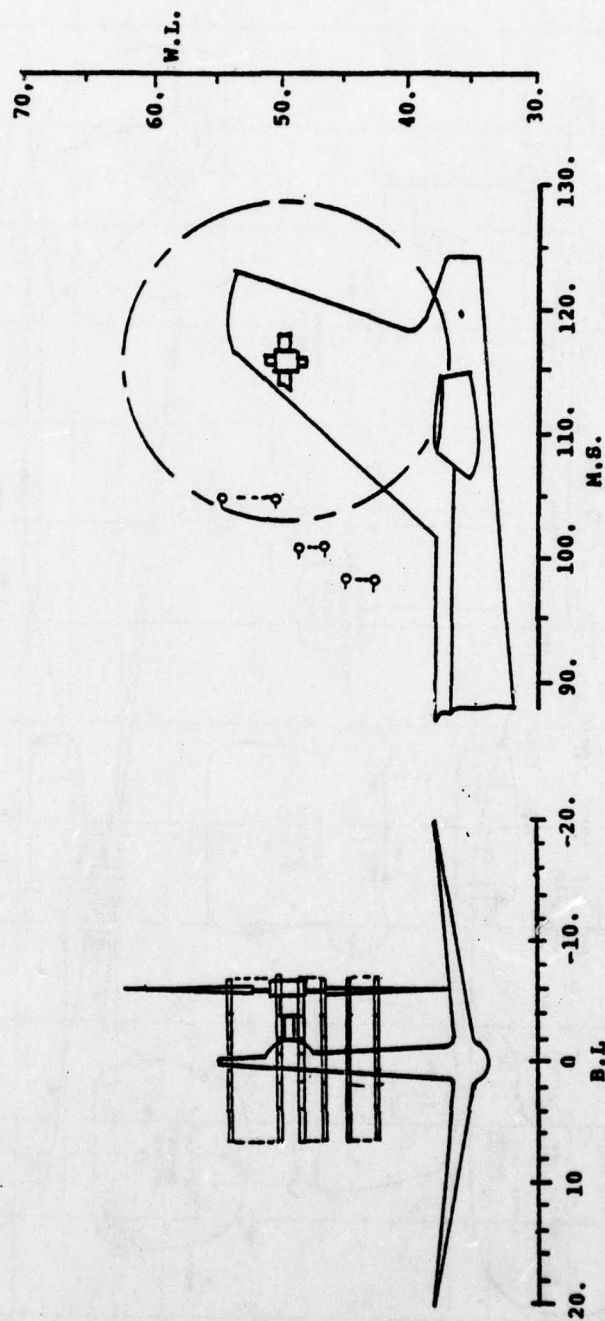


FIGURE 6 -HOT FILM RAKE LOCATIONS

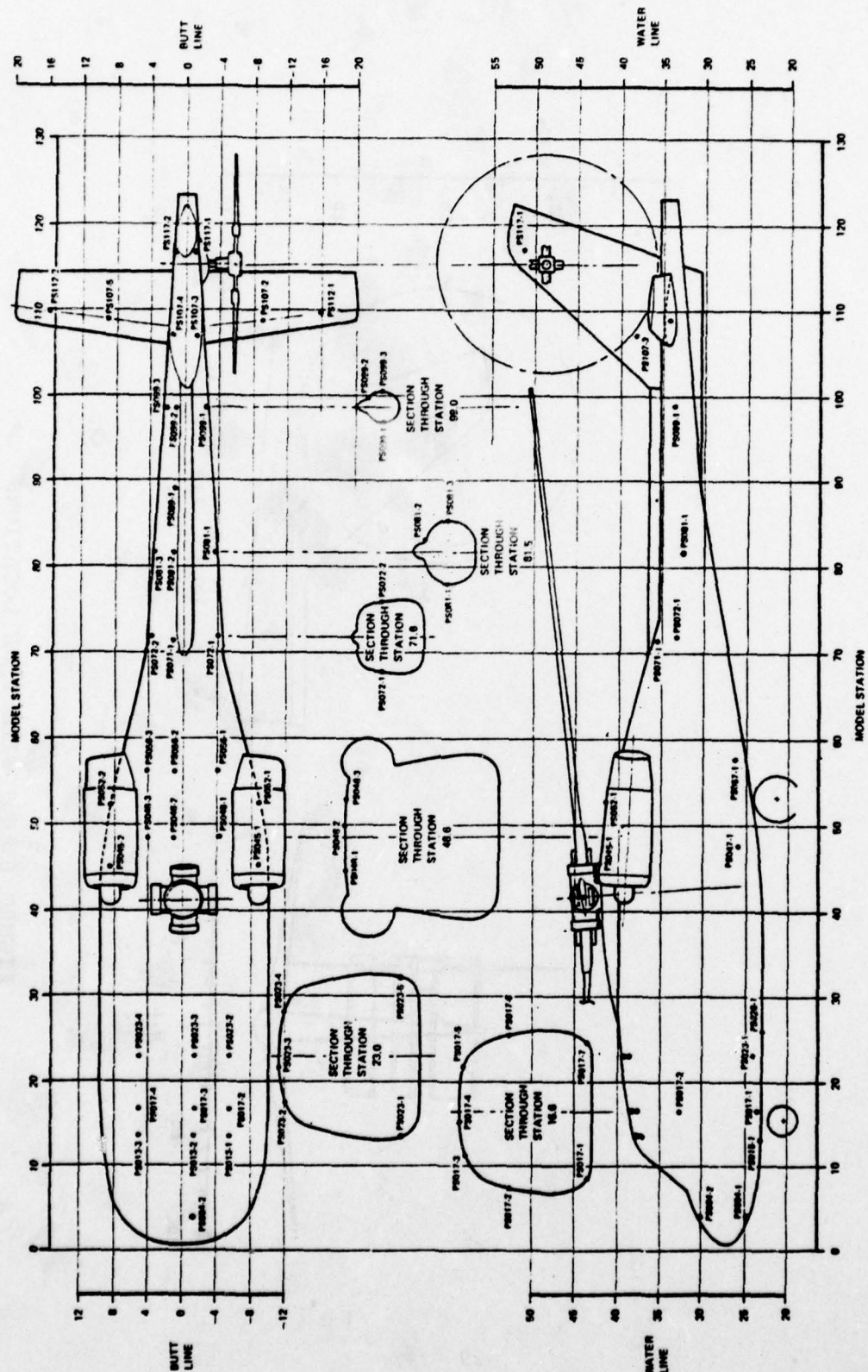


FIGURE 7 -1/4.85 SCALE MODEL GEOMETRY AND
SURFACE PRESSURE TRANSDUCER LOCATIONS

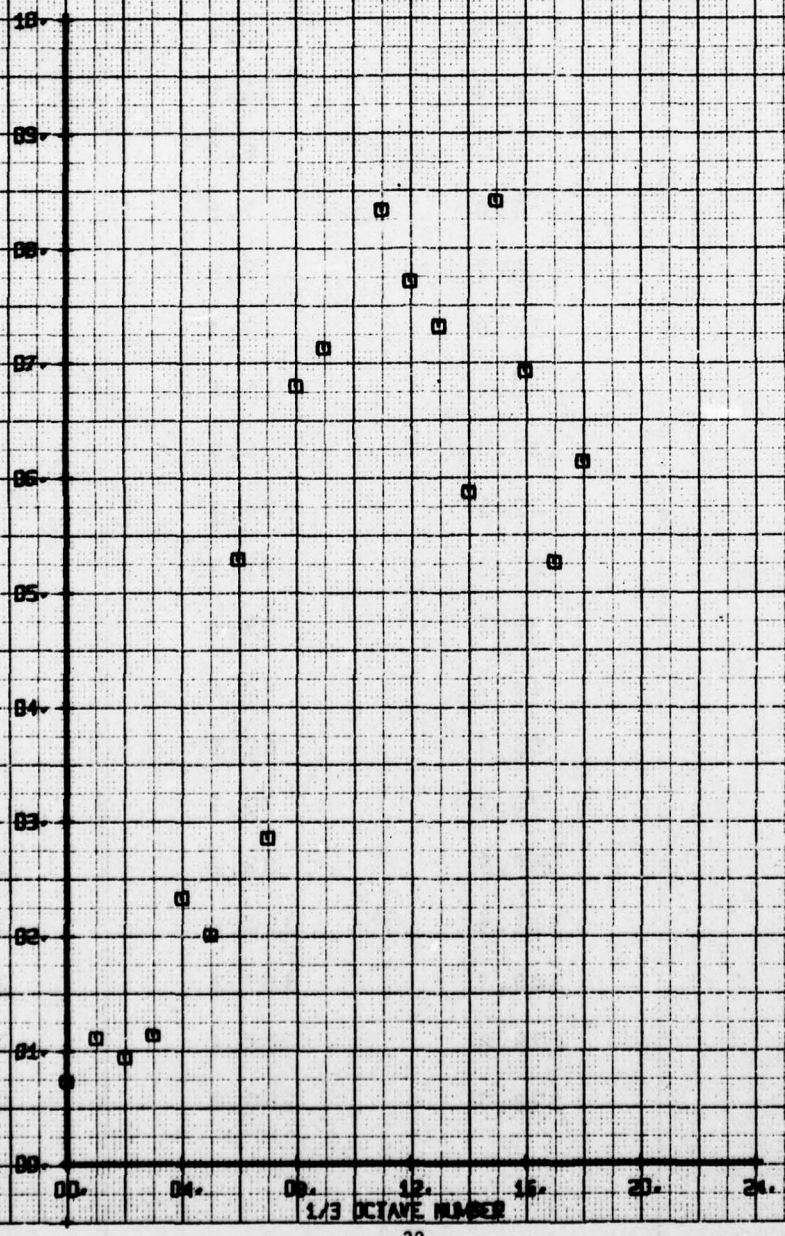
TABLE 4
1/3 OCTAVE BAND IDENTIFICATION

BAND NUMBER	BAND WIDTH - Hz		
	MINIMUM	CENTER	MAXIMUM
0	3.5	3.4	4.4
1	4.4	4.9	5.5
2	5.5	6.2	7.0
3	7.0	7.8	8.7
4	8.7	9.8	11.0
5	11.0	12.4	13.9
6	13.4	15.6	17.5
7	17.5	19.7	22.1
8	22.1	24.8	27.8
9	27.8	31.25	35.1
10	35.1	39.4	44.2
11	44.2	49.6	55.7
12	55.7	62.5	70.2
13	70.2	78.7	88.9
14	88.9	99.2	111.4
15	111.4	125.0	140.3
16	140.3	157.5	176.8
17	176.8	198.4	222.7
18	222.7	250.0	280.6

NOV FILM WAVE 1/3 OCTAVE ANALYSIS
 AIR F.F.T. 7.60.1.256 20PSY BASIC E4
 RUN 195 TP 1

SYM 0
 CY 06
 PARAMETER ALPHA

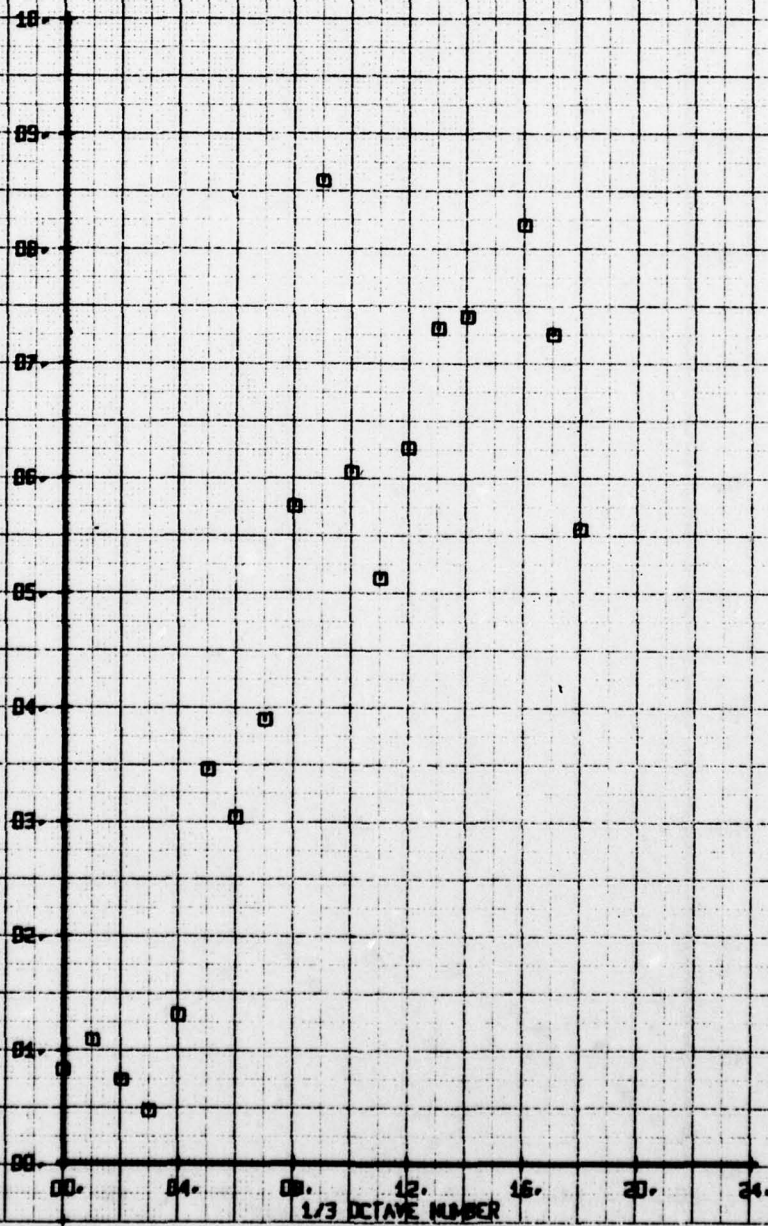
VERTICAL FLOW ANGLE, ALPHA - DEGREES



HOT FILM WAVE 1/3 OCTAVE ANALYSIS
 AIR FLOW: 7.60 L. 25G 20PSI BASIC E1
 RUN 155 TP 2

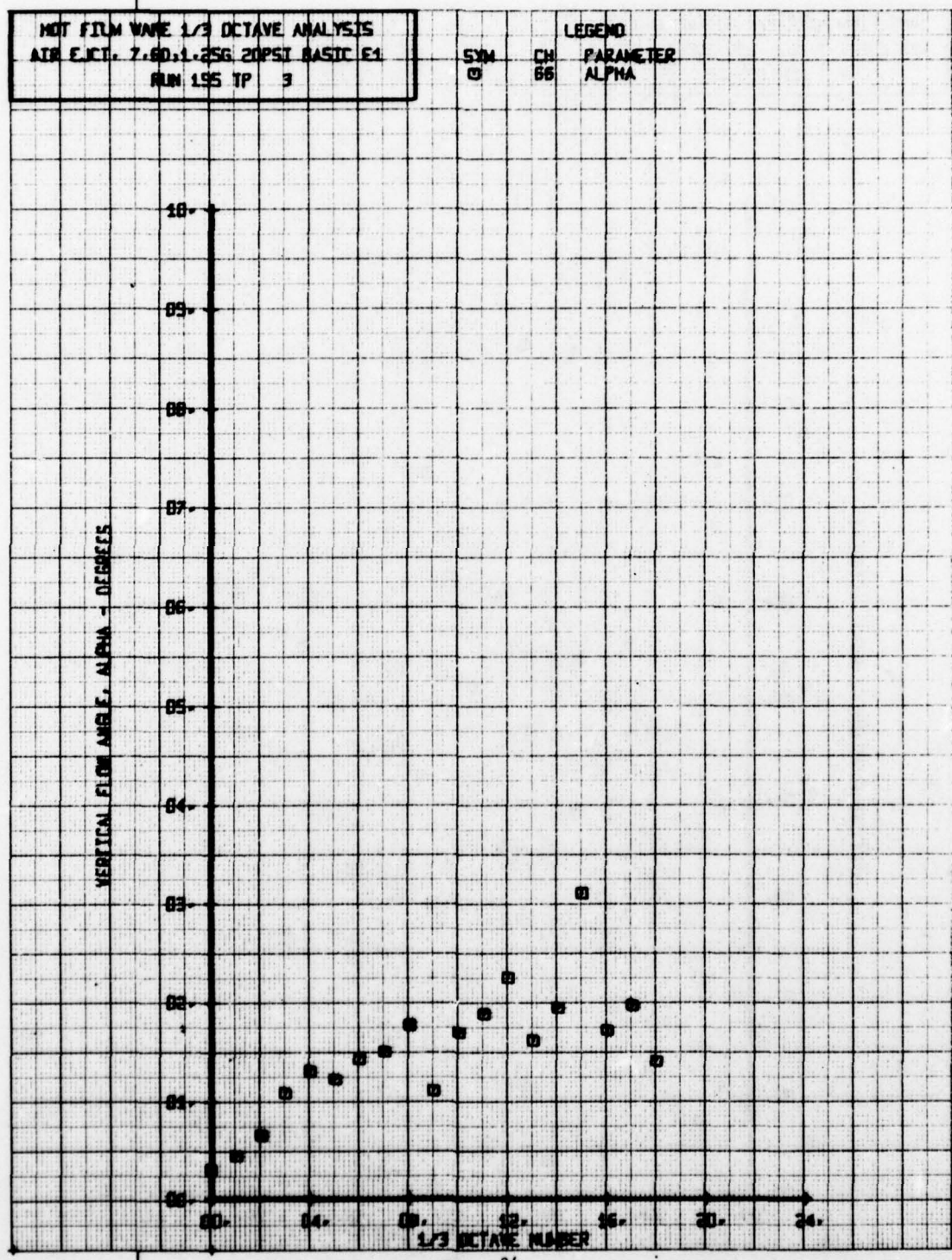
SYM	CH	PARAMETER
0	66	ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES



HOT FILM WAVE 1/3 OCTAVE ANALYSIS
 AIR FCT. 7.60, 1.256 20PST BASTIC E1
 RUN 155 TP 3

SYM	CH	PARAMETER
0	66	ALPHA



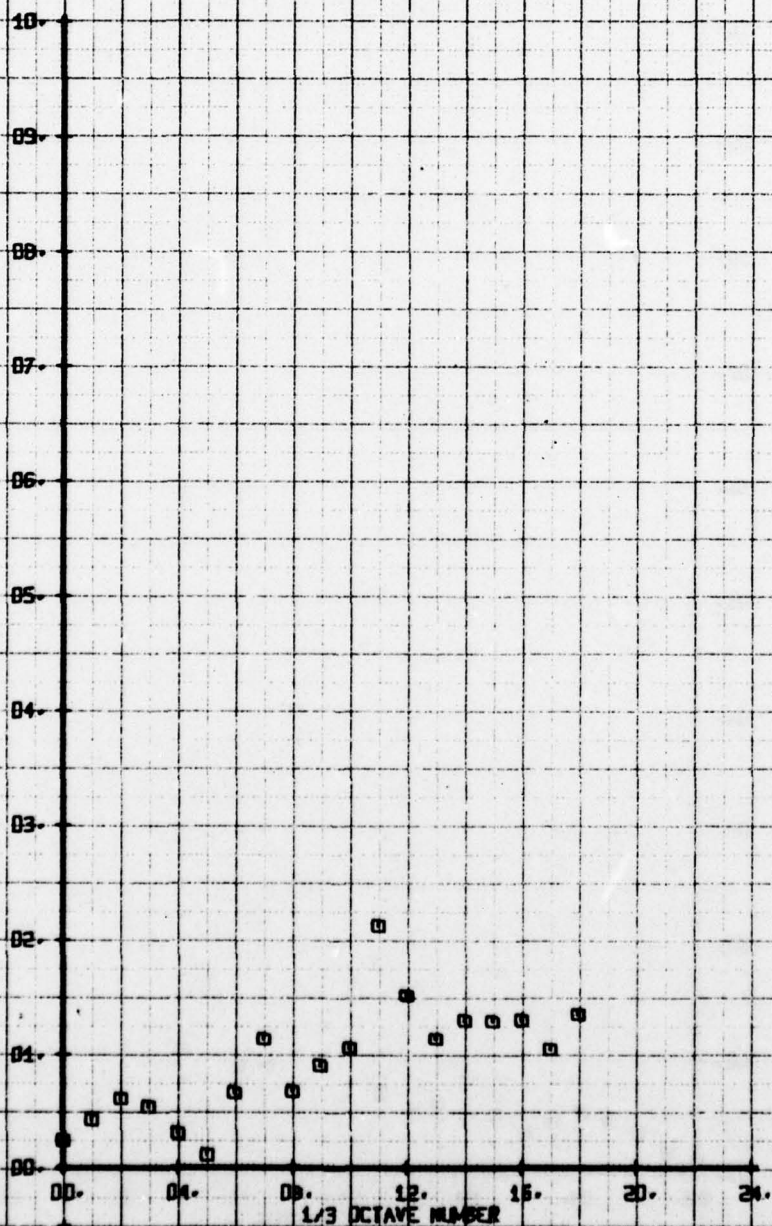
NOY FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR E.V.T. 2.60.1.25G 20PSY BASIC E1
 RUN 195 TP 4

SYM
 □

CH
 06

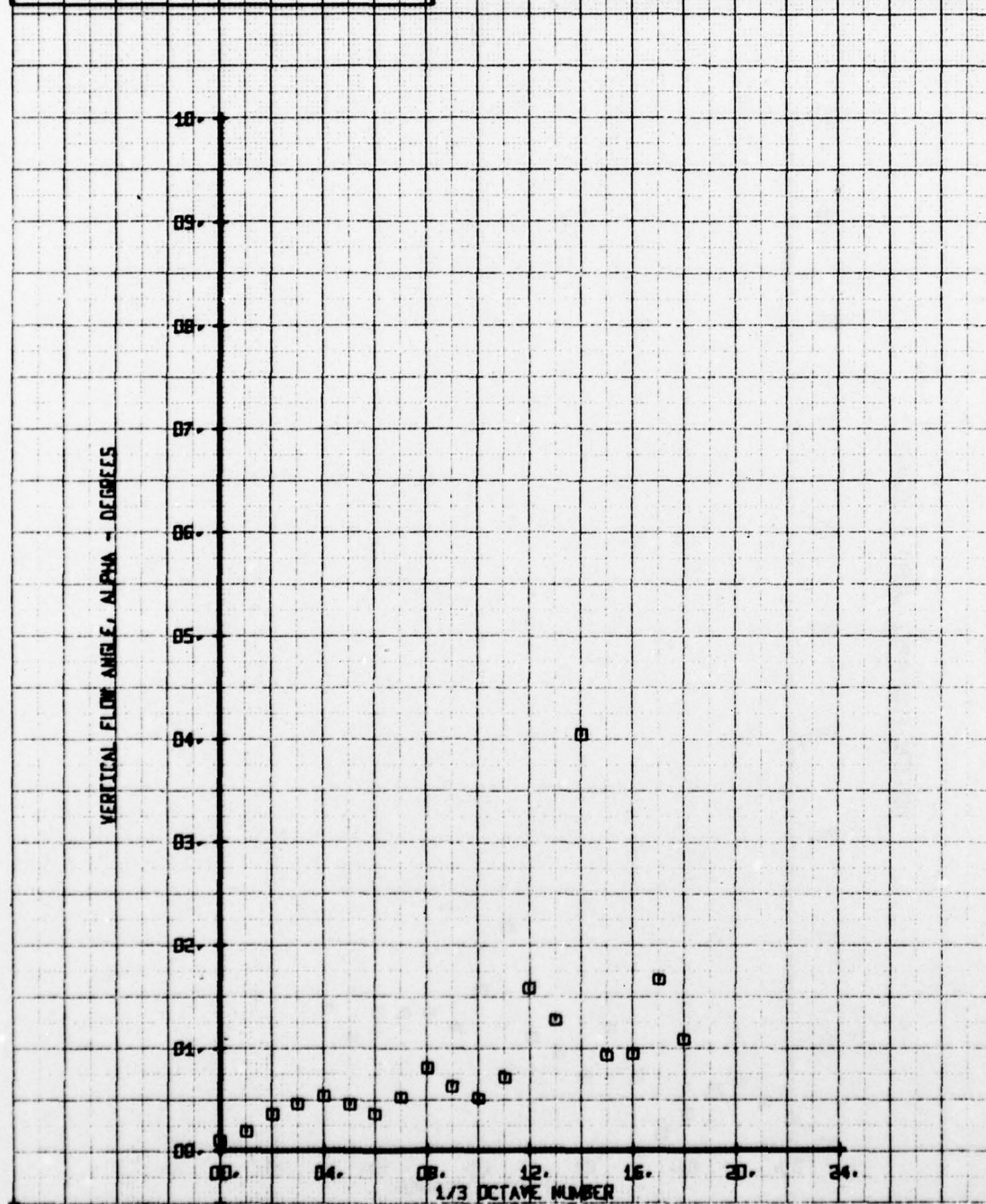
LEGEND
 PARAMETER
 ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES



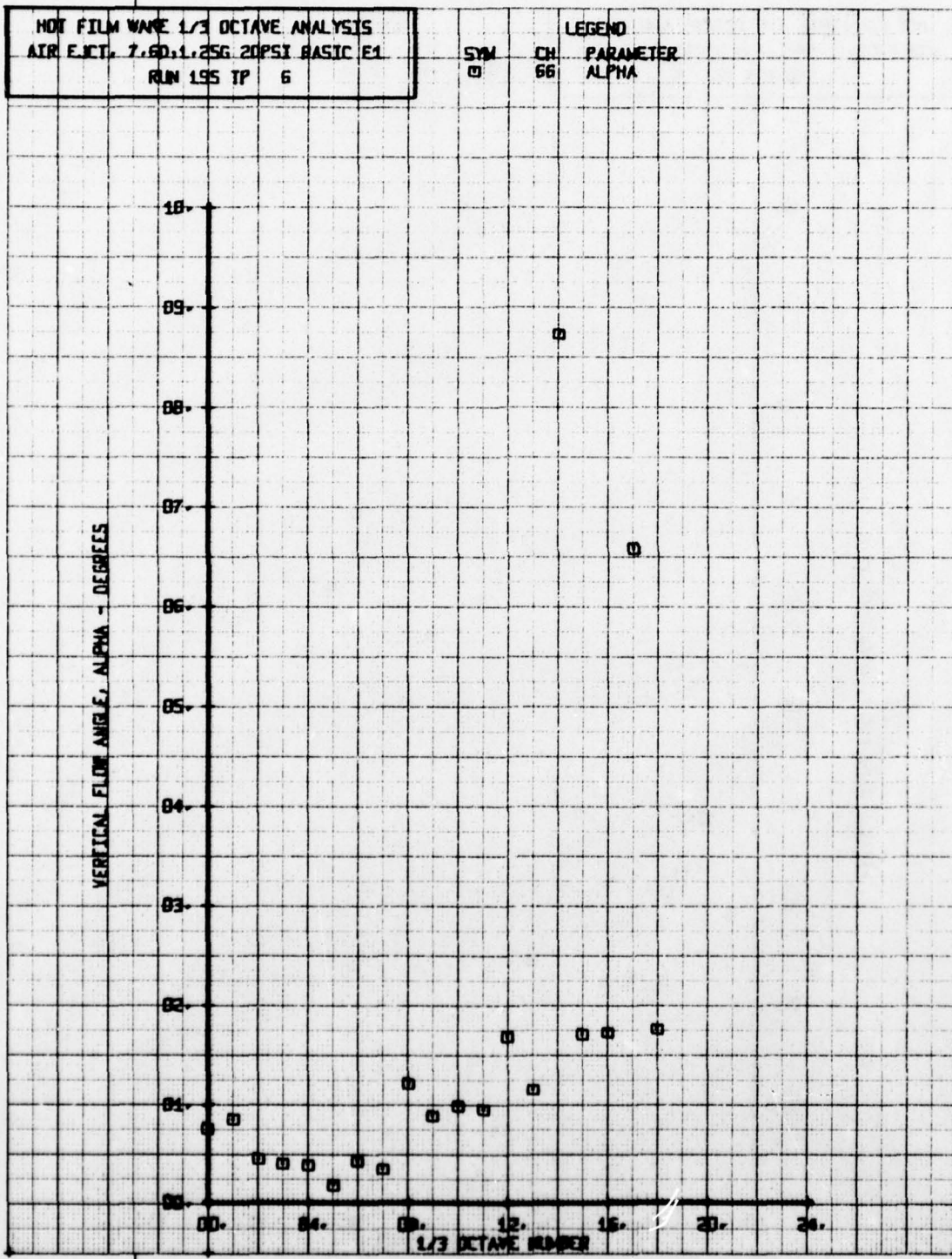
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60, 1.25G 20P51 BASIC E1
 RUN 195 TP 5

LEGEND	
SYM	CH
□	66
	PARAMETER
	ALPHA



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR FLOW: 7.60, 1.25G 20PSI BASIC E1
 RUN 195 TP 6

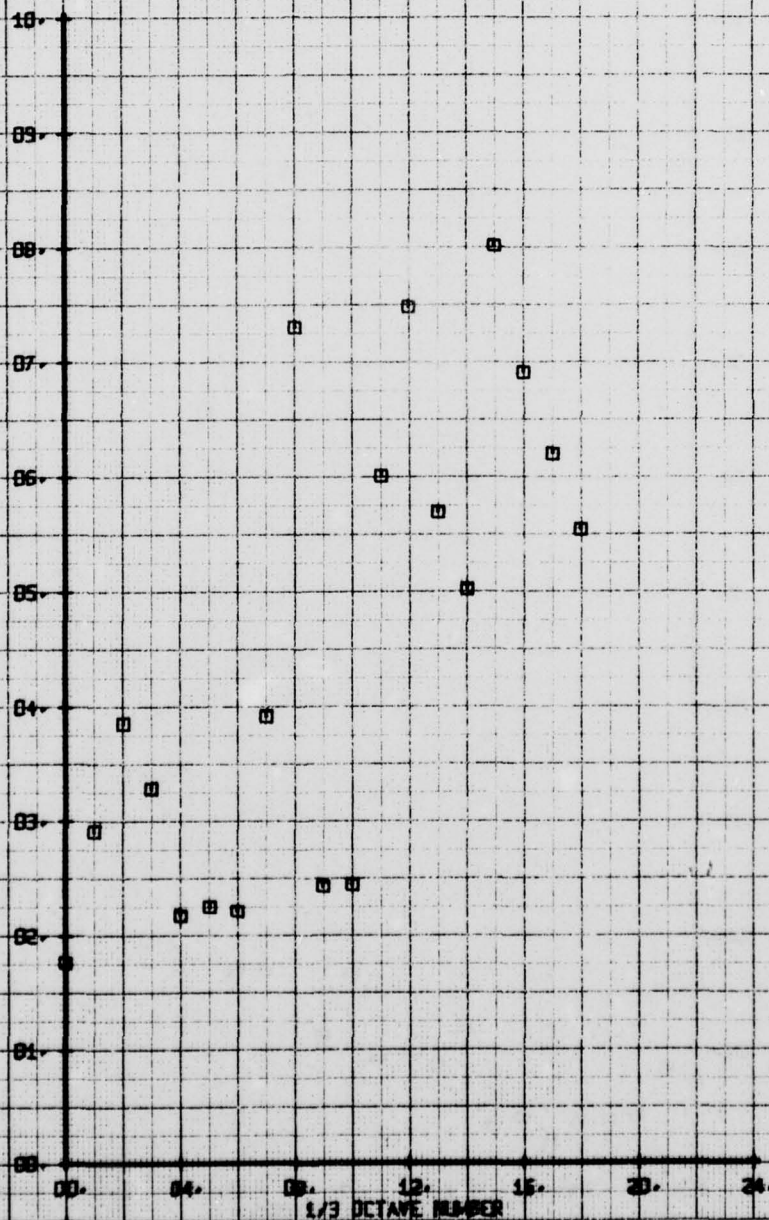
LEGEND	
SYM	CH
□	66
	PARAMETER
	ALPHA



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60, 1.25G 20PSI BASIC E1
 RUN 195 TP 1

SYN CH PARAMETER
 □ 65 BETA

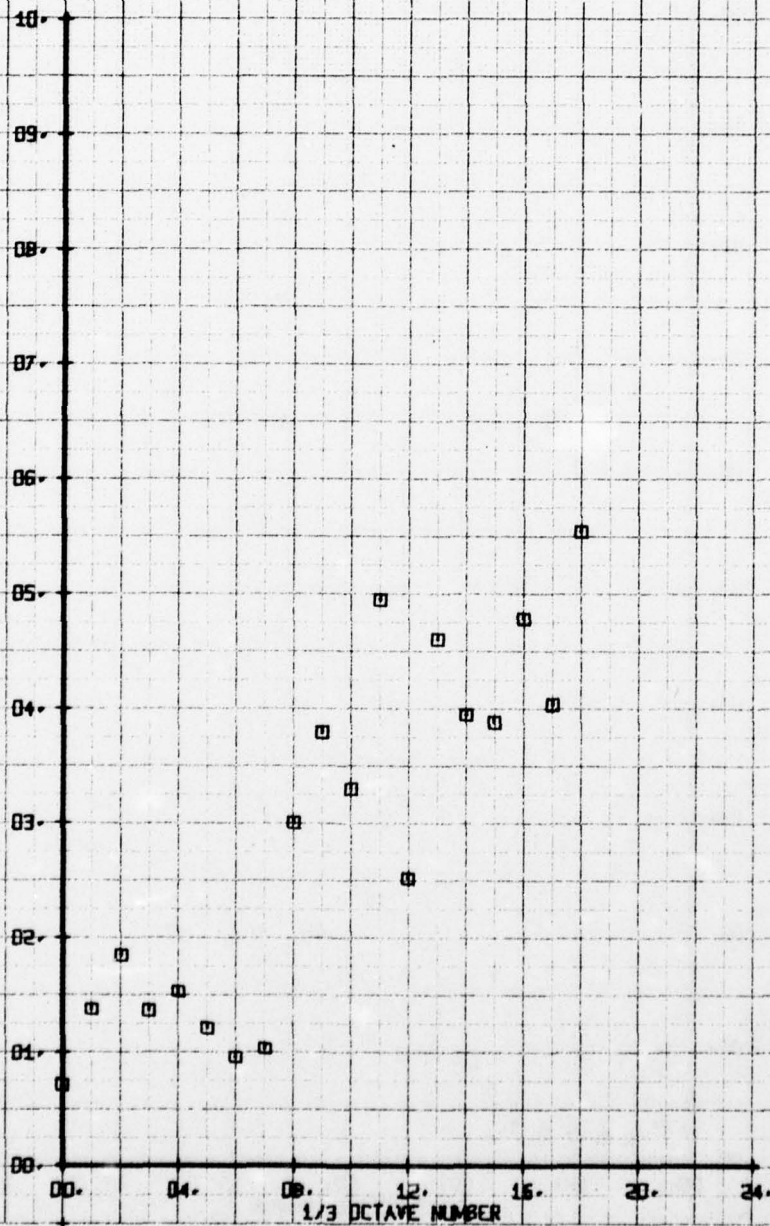
LATERAL FLOW ANGLE, BETA - DEGREES

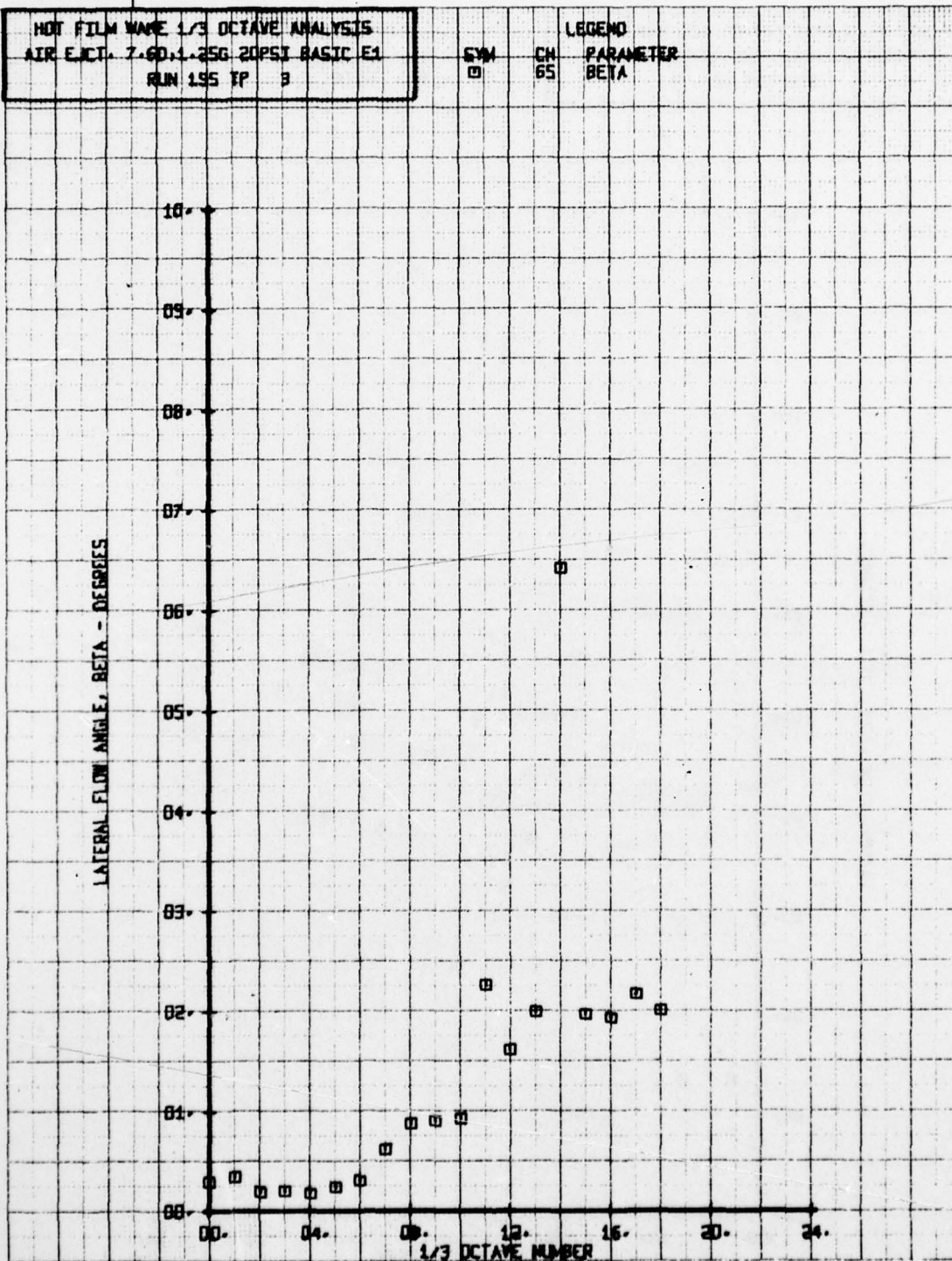


HOT FILM WAVE 1/3 OCTAVE ANALYSIS
 AIR FLOW: 7.60, 1.25G 20PSI BASIC E1
 RUN 195 TP 2

SYM CH PARAMETER
 □ 65 BETA

LATERAL FLOW ANGLE, BETA - DEGREES

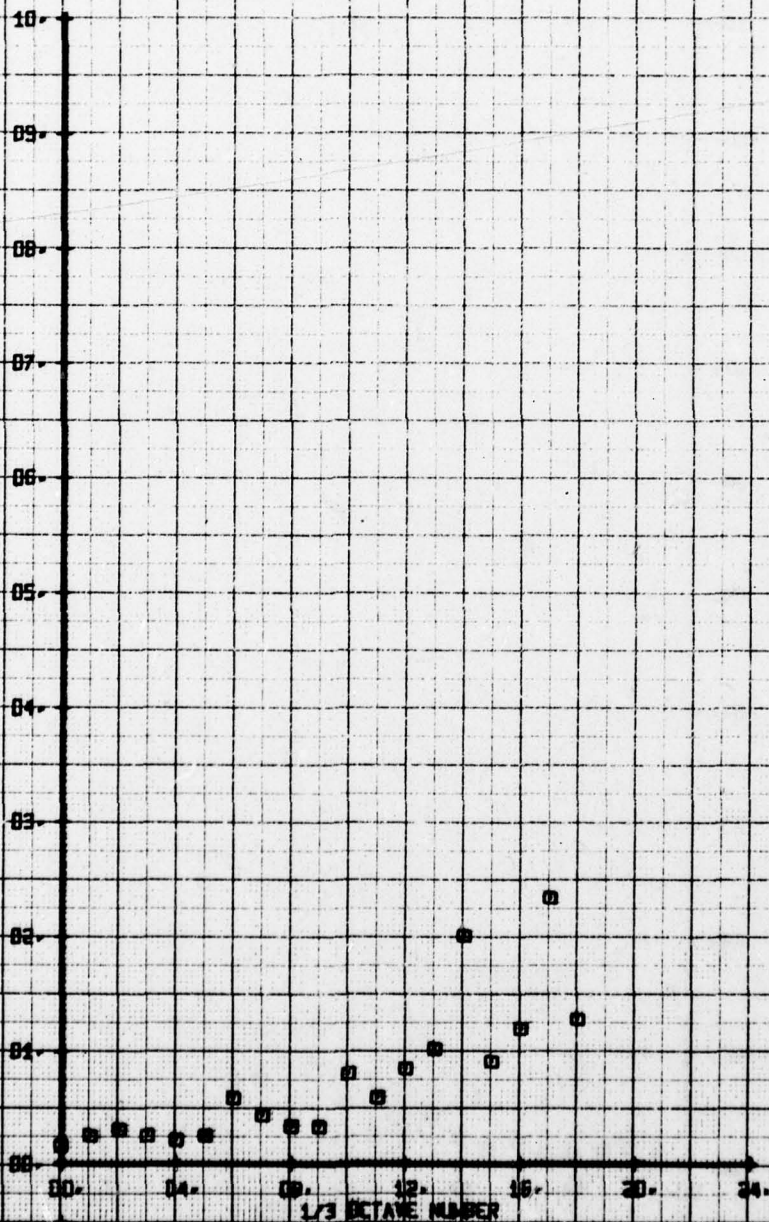




HOT FILM WAVE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60, 1.25G, 20PSI BASIC E1
 RUN 195 T' 4

SYM	CH	PARAMETER
□	65	BETA

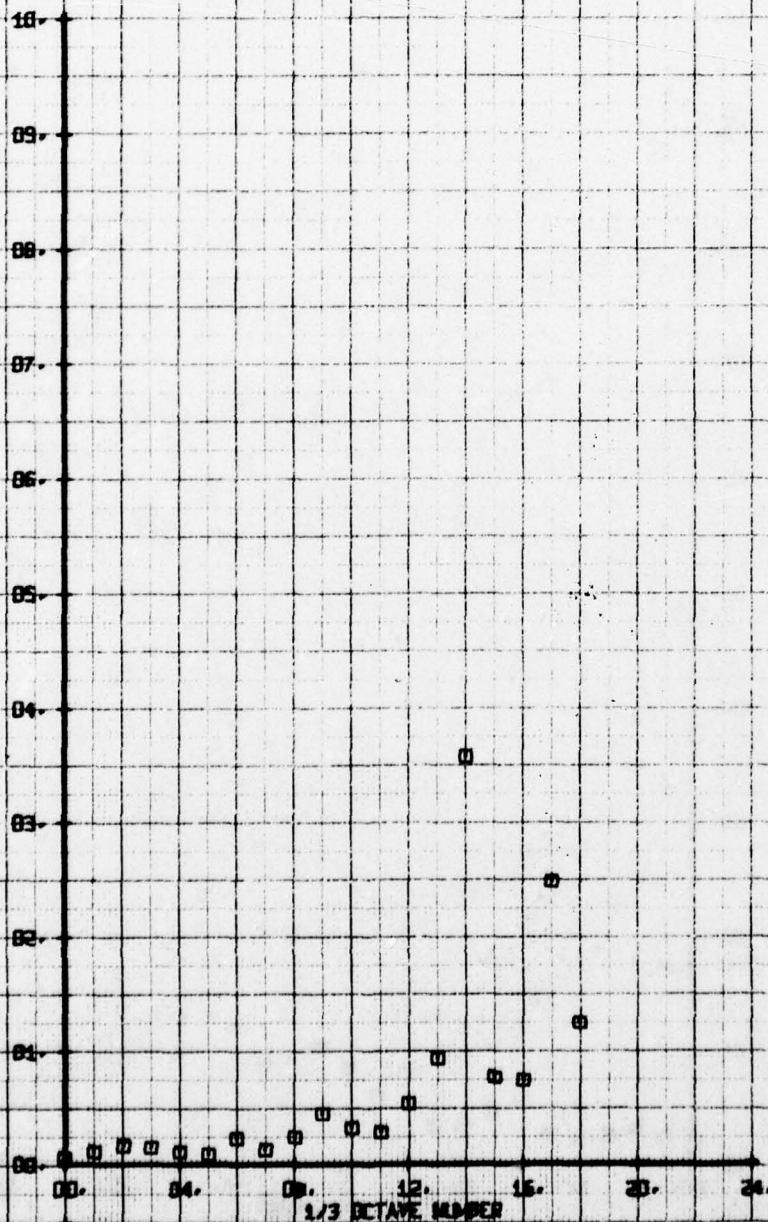
LATERAL FLOW ANGLE, BETA - DEGREES

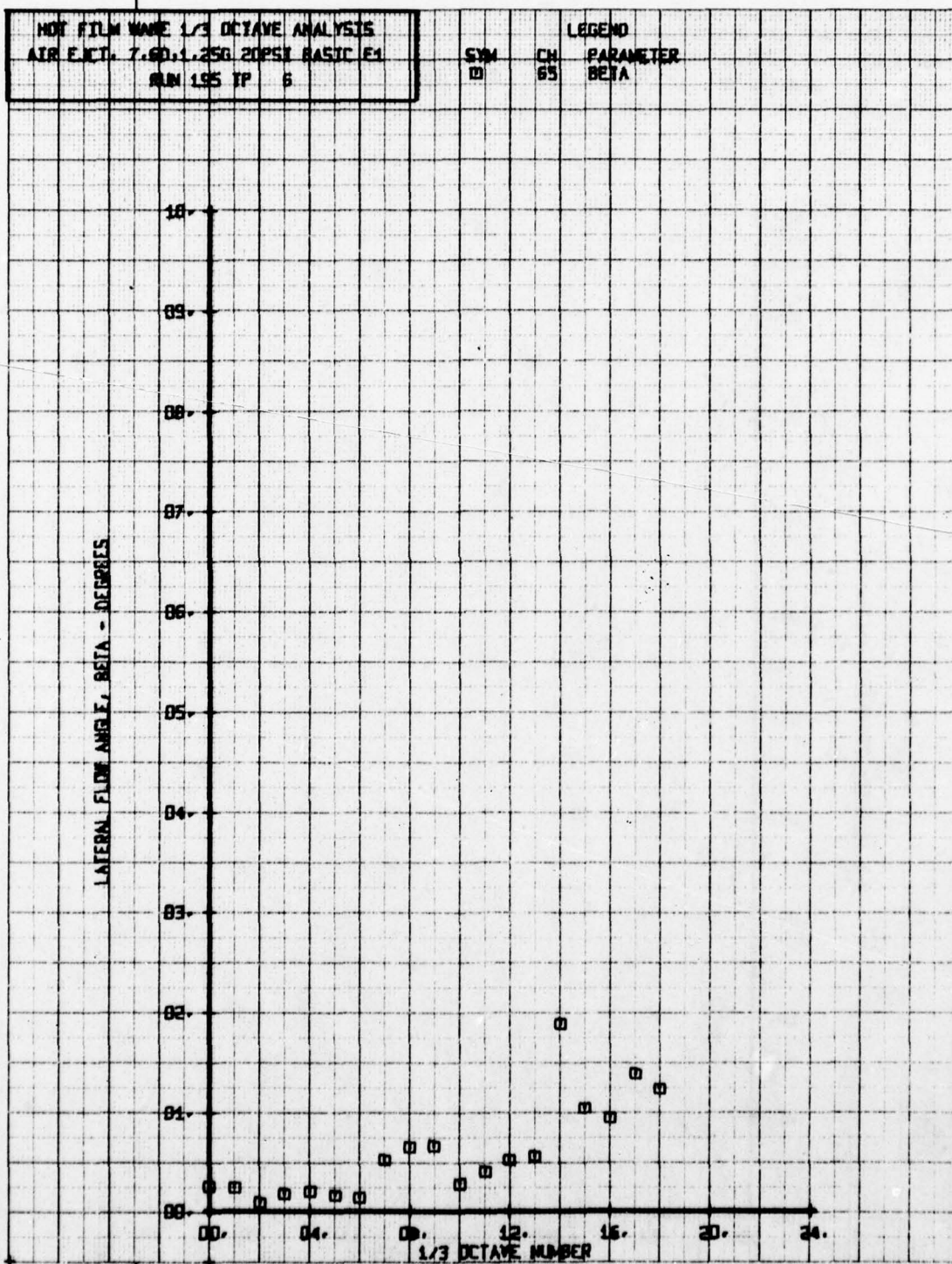


HOT FILM WARE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60, 1.25G 20PSI BASIC E1
 RUN 195 TP 5

SYM	CH	LEGEND
□	65	PARAMETER BETA

LATERAL FLOW ANGLE, BETA - DEGREES

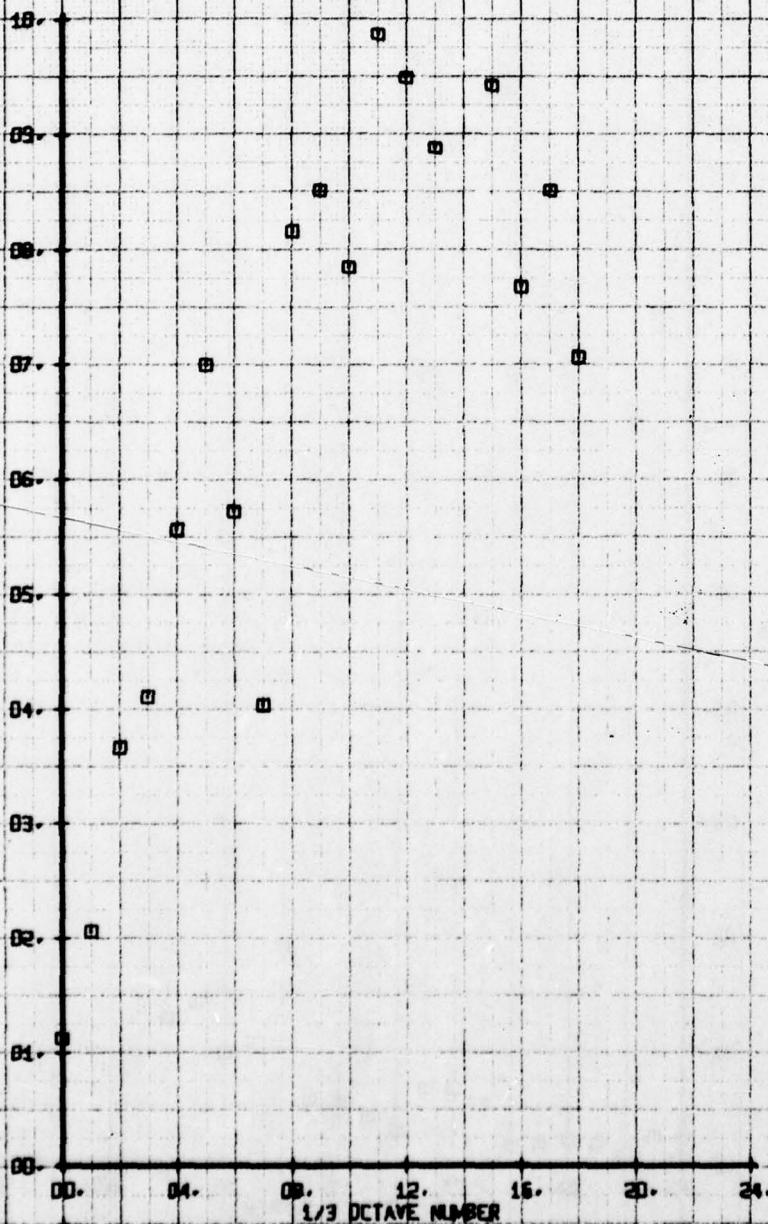




HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR ENT. 7.60, 1.256 20PSI BASIC E1
 RUN 195 TP 1

SYN CH LEGEND
 01 66 PARAMETER
 Y-ALPHA

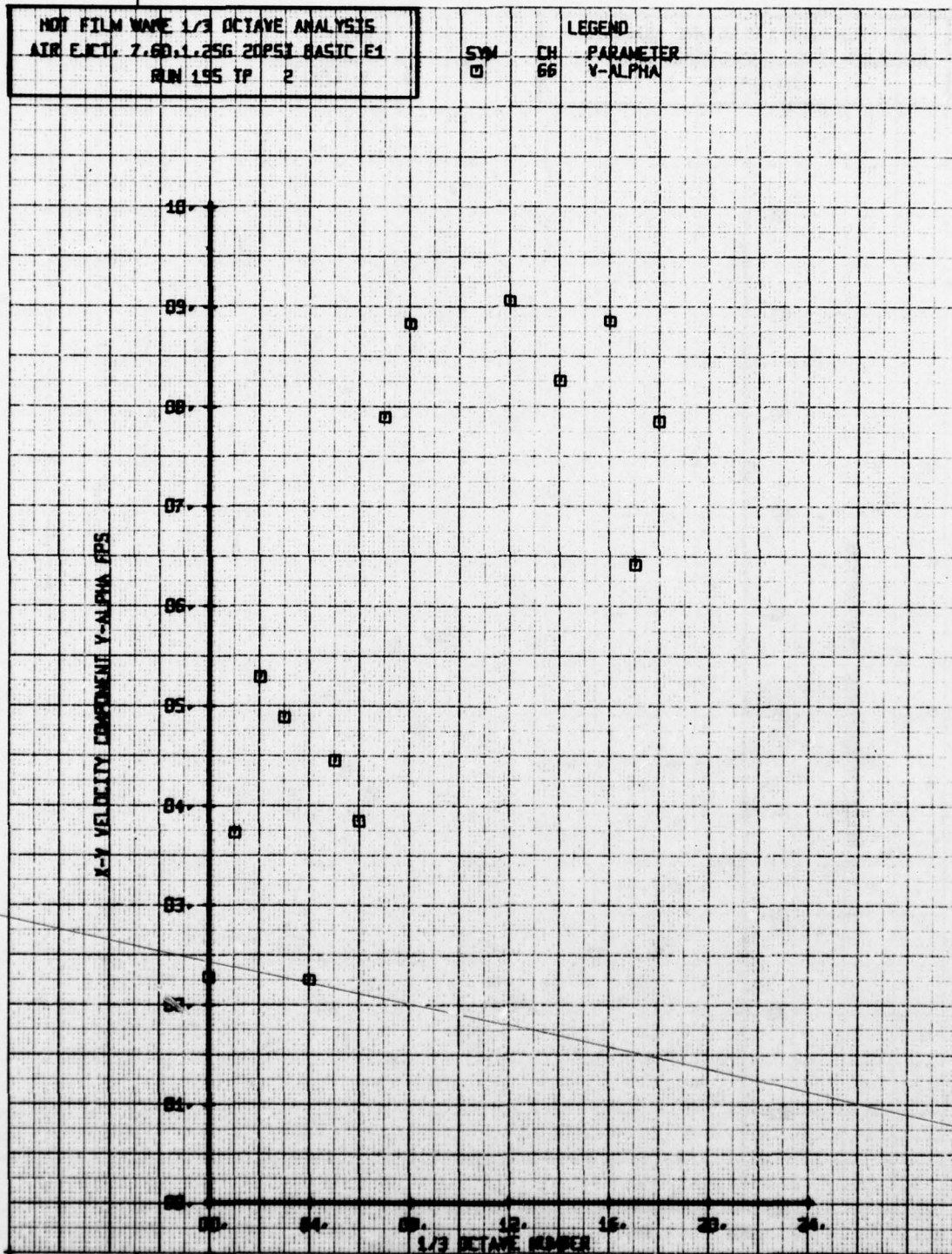
X-Y VELOCITY COMPONENT Y-ALPHA EPS

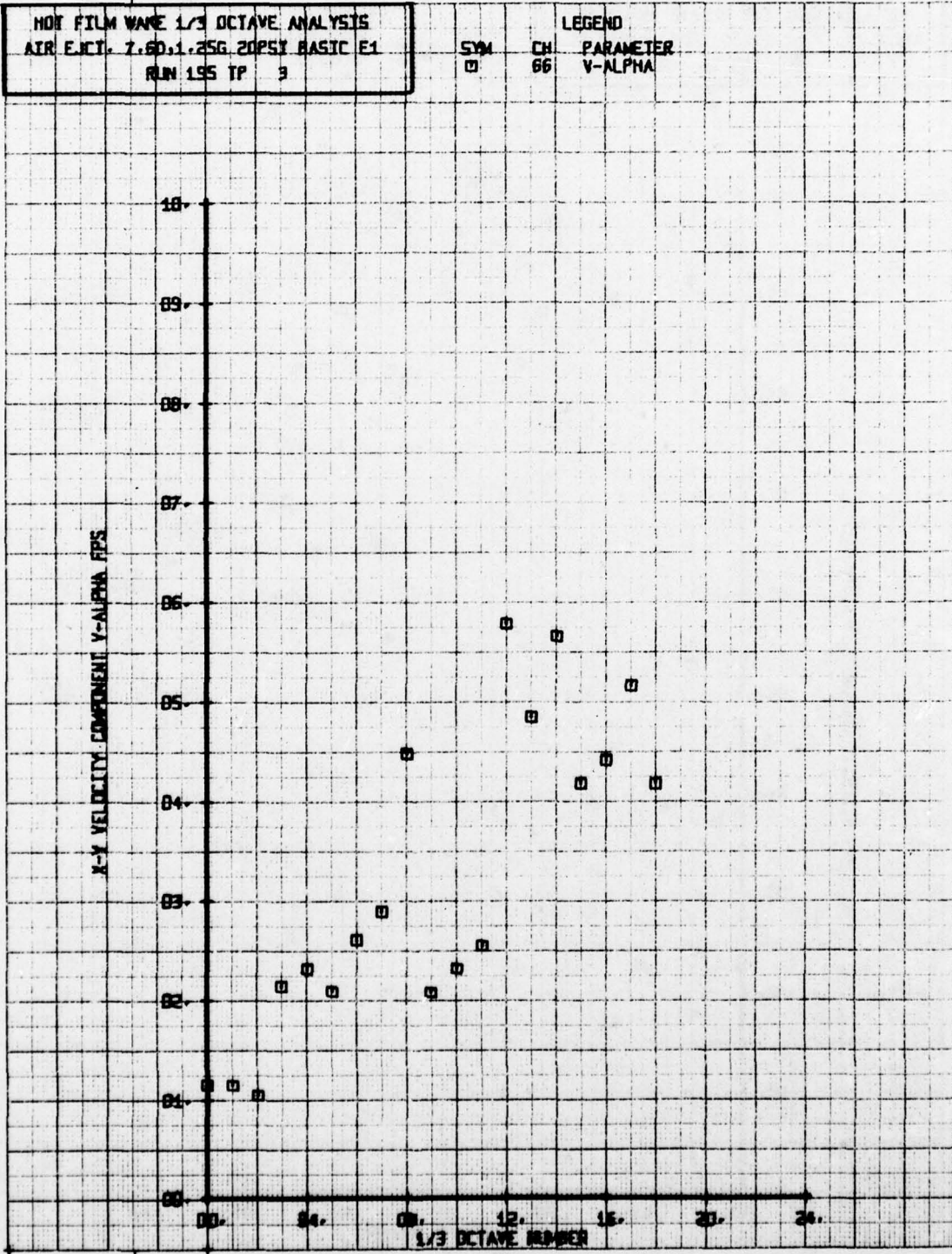


NOT FILM WAVE 1/3 OCTAVE ANALYSIS
 AIR ECT. 7.60 1.25G 20PSI BASIC E1
 RUN 195 TP 2

SYM CH PARAMETER
 □ 66 V-ALPHA

X-Y VELOCITY COMPONENT V-ALPHA FPS

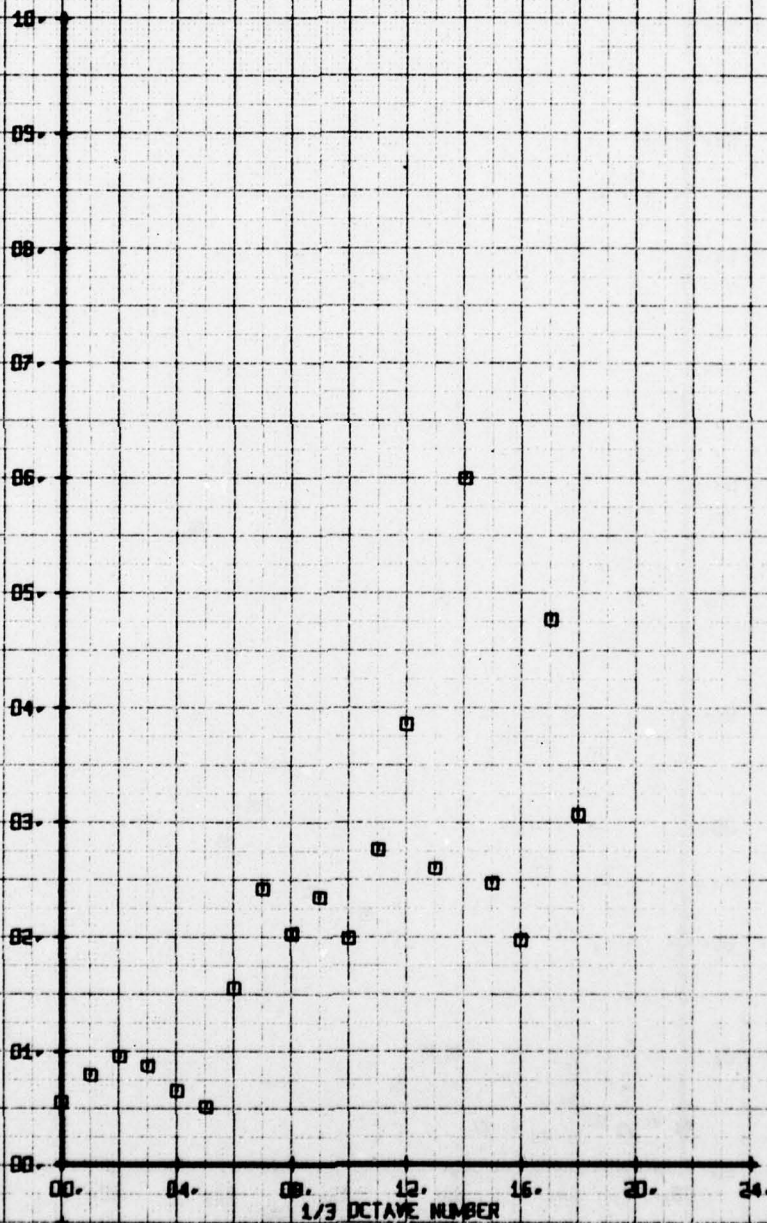




NOT FILM WAVE 1/3 OCTAVE ANALYSIS
 ATR ECT. 7.60.1.256 20PST BASIC E1
 RUN 195 TP 4

SYM	CH	PARAMETER
0	66	V-ALPHA

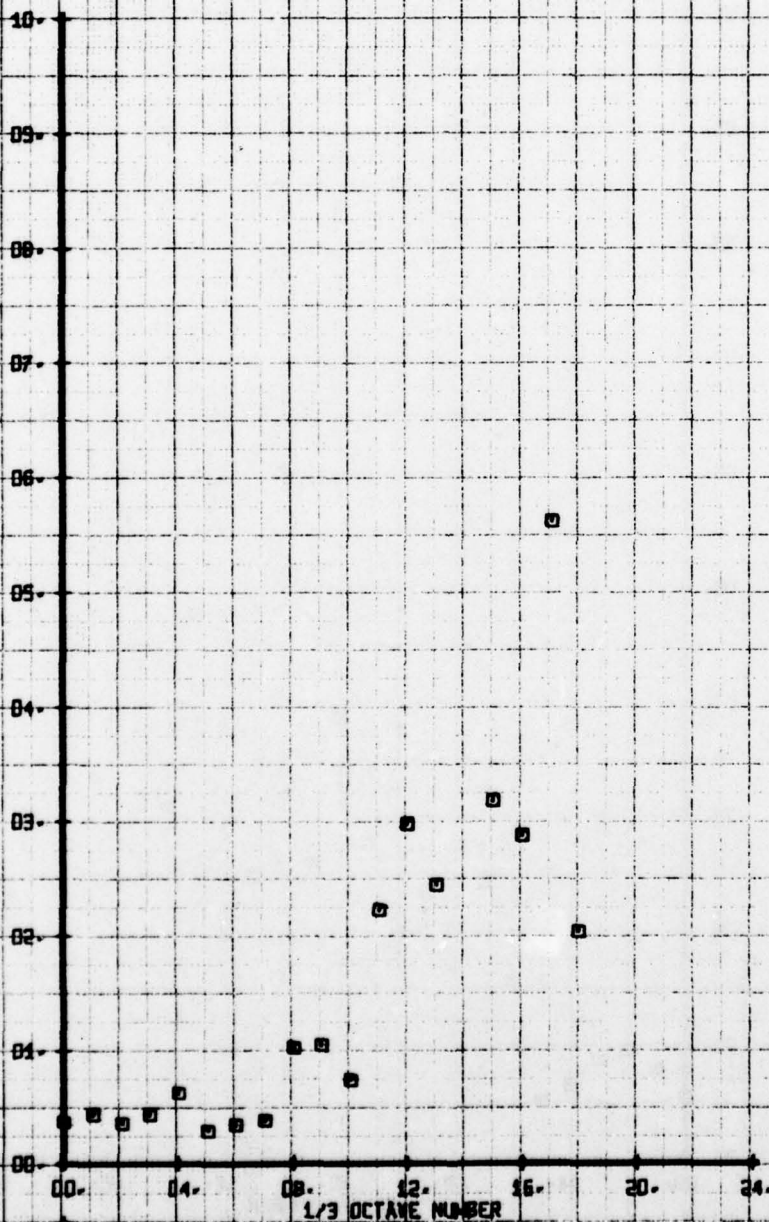
X-Y VELOCITY COMPONENT V-ALPHA FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR FLOW: 7.60, 1.25G 20PST BAST E1
 RUN 195 TP 5

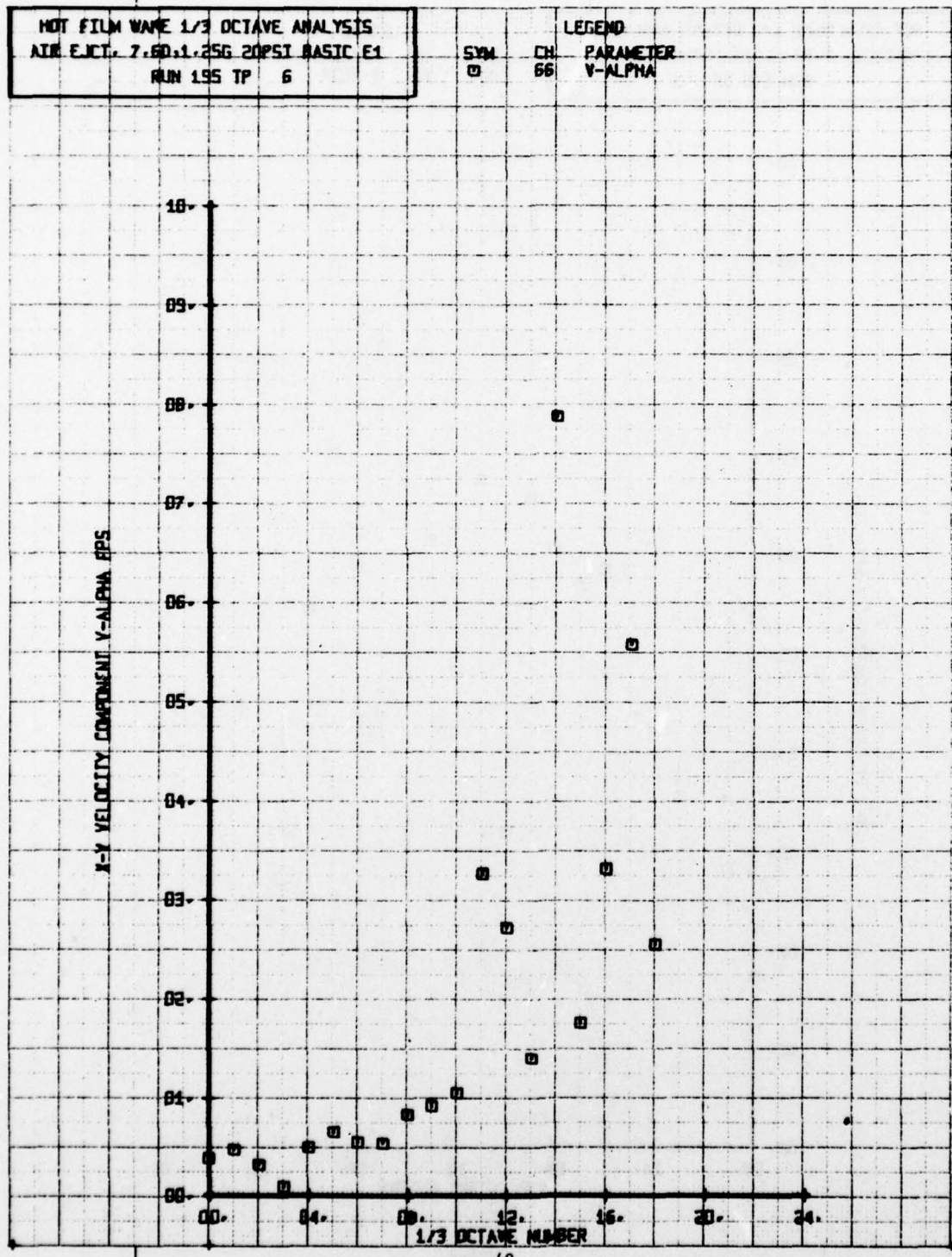
SYM CH PARAMETER
 @ 66 Y-ALPHA

X-Y VELOCITY COMPONENT Y-ALPHA PPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60:1.25G 20PSI BASIC E1
 RUN 195 TP 6

SYN CH PARAMETER
 0 66 V-ALPHA



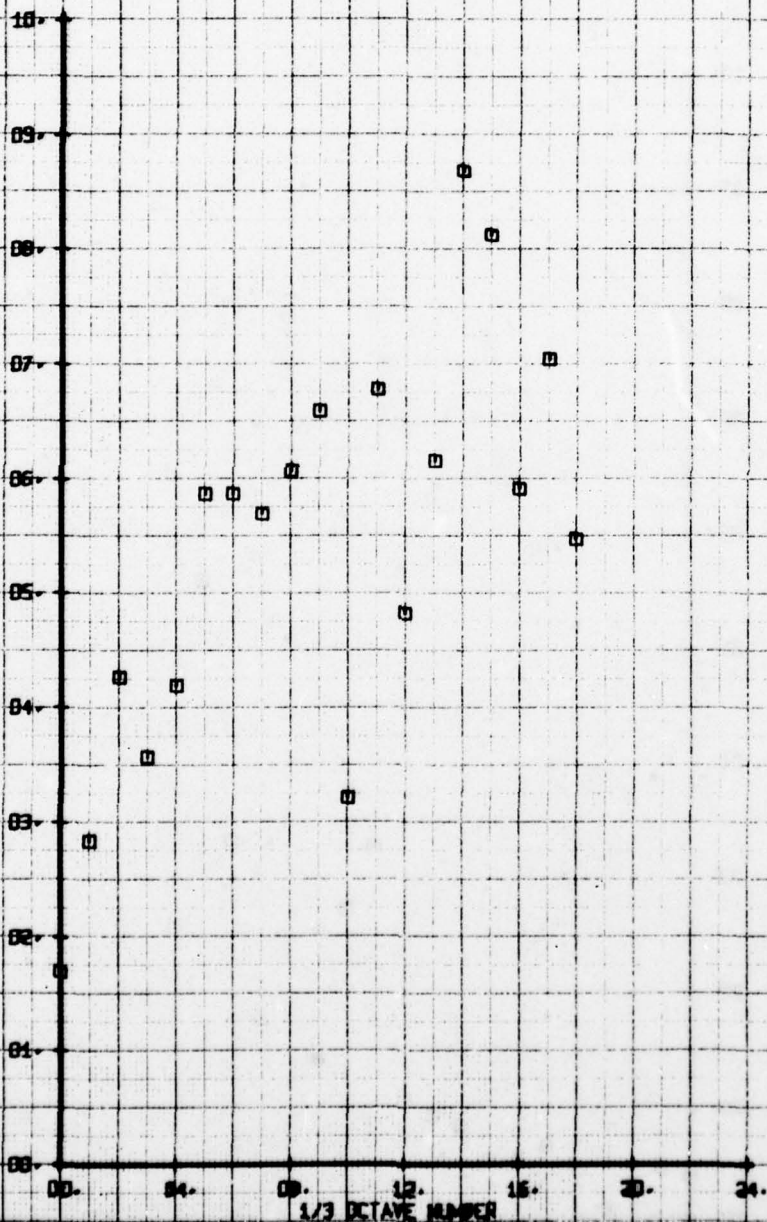
NOV FILM WAVE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60-1.25G 20PSI BASIC E1
 RUN 195 TP 1

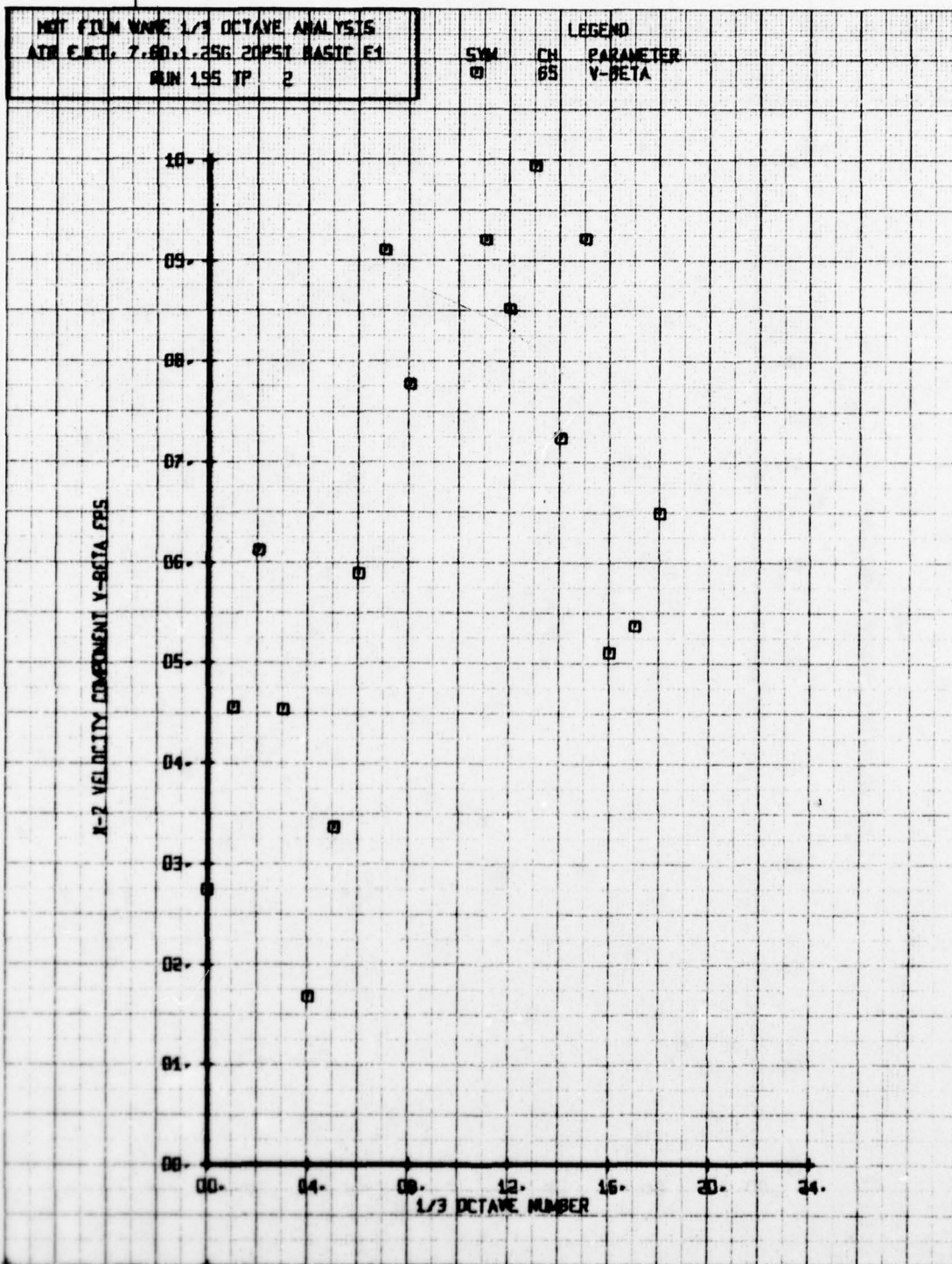
SYM
 □

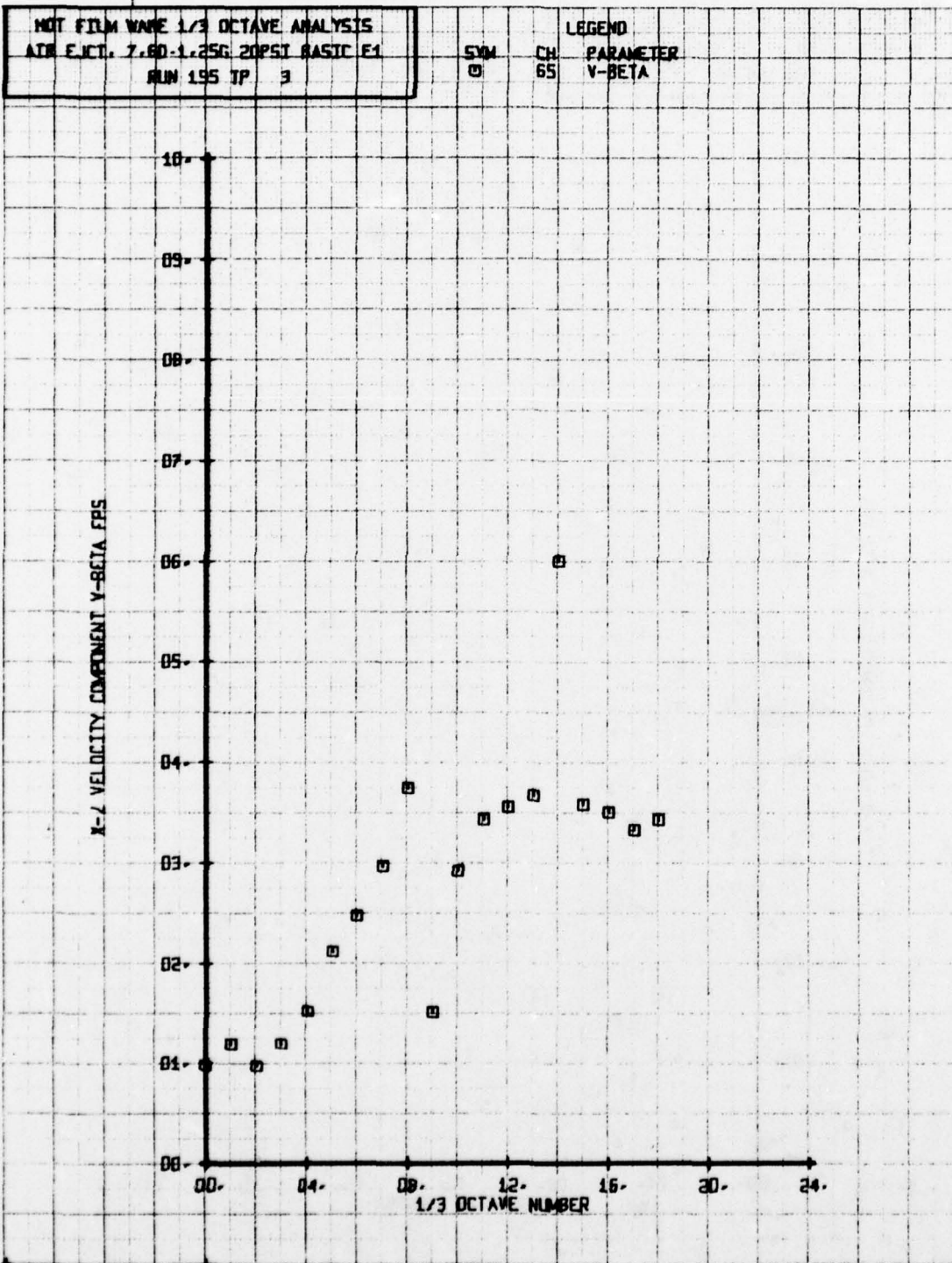
CH
 65

LEGEND
 PARAMETER
 V-BETA

X-Z VELOCITY COMPONENT V-BETA FBS

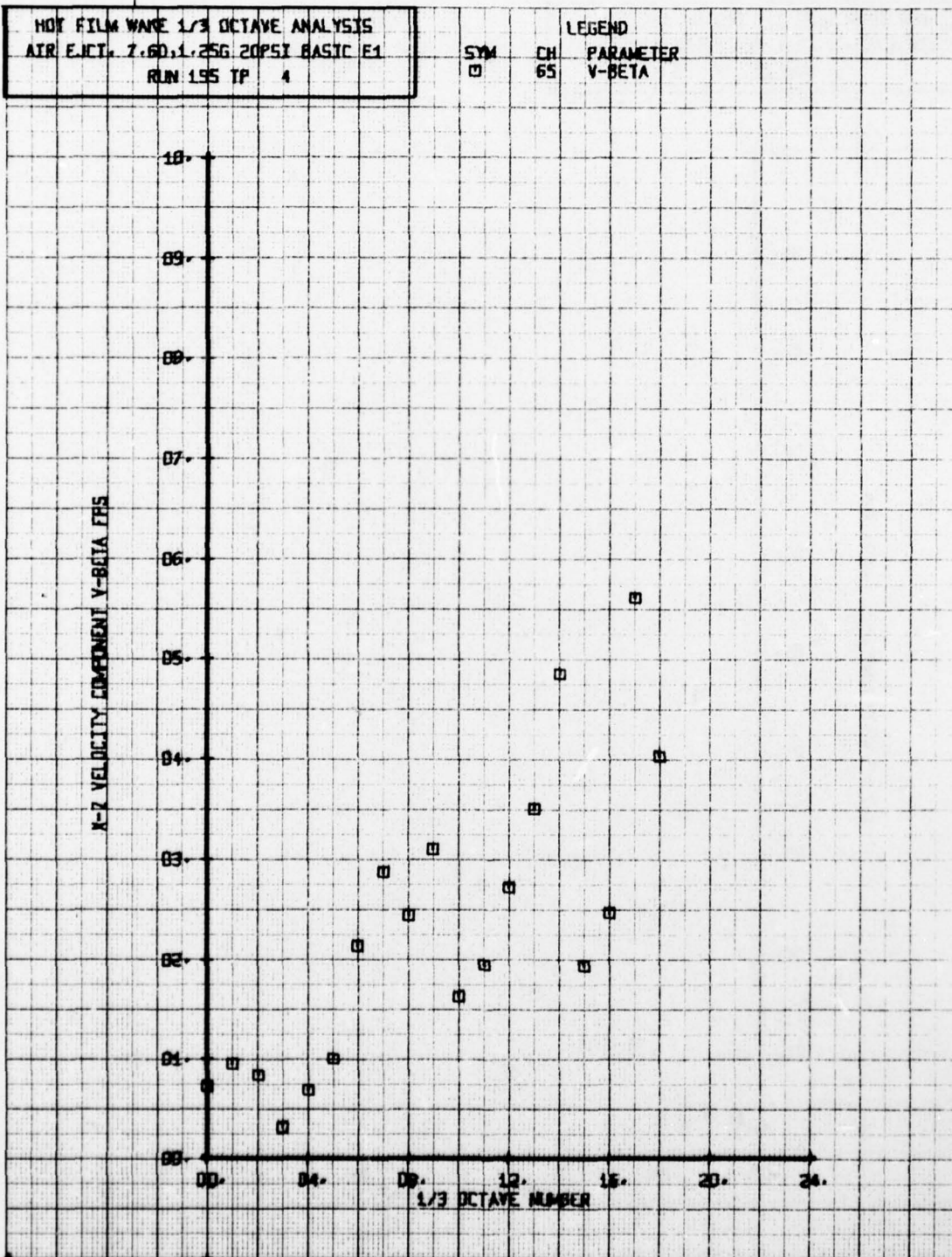






HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR FLOW: 7.60, 1.25G 20PSI BASIC E1
 RUN 195 TP 4

SYM	CH	LEGEND
□	65	PARAMETER V-BETA



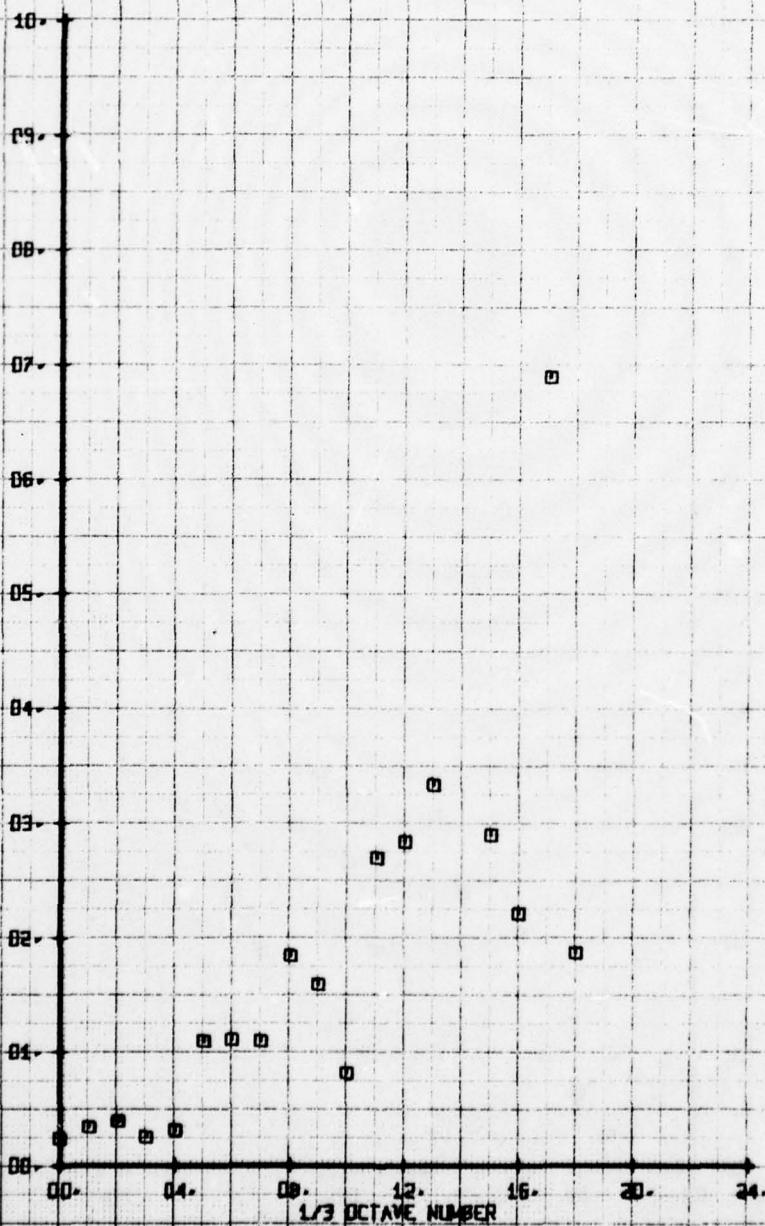
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60, 1.25G 20PSI BASIC E1
 RUN 195 TP 5

SYM
 □

CH
 65

LEGEND
 PARAMETER
 V-BETA

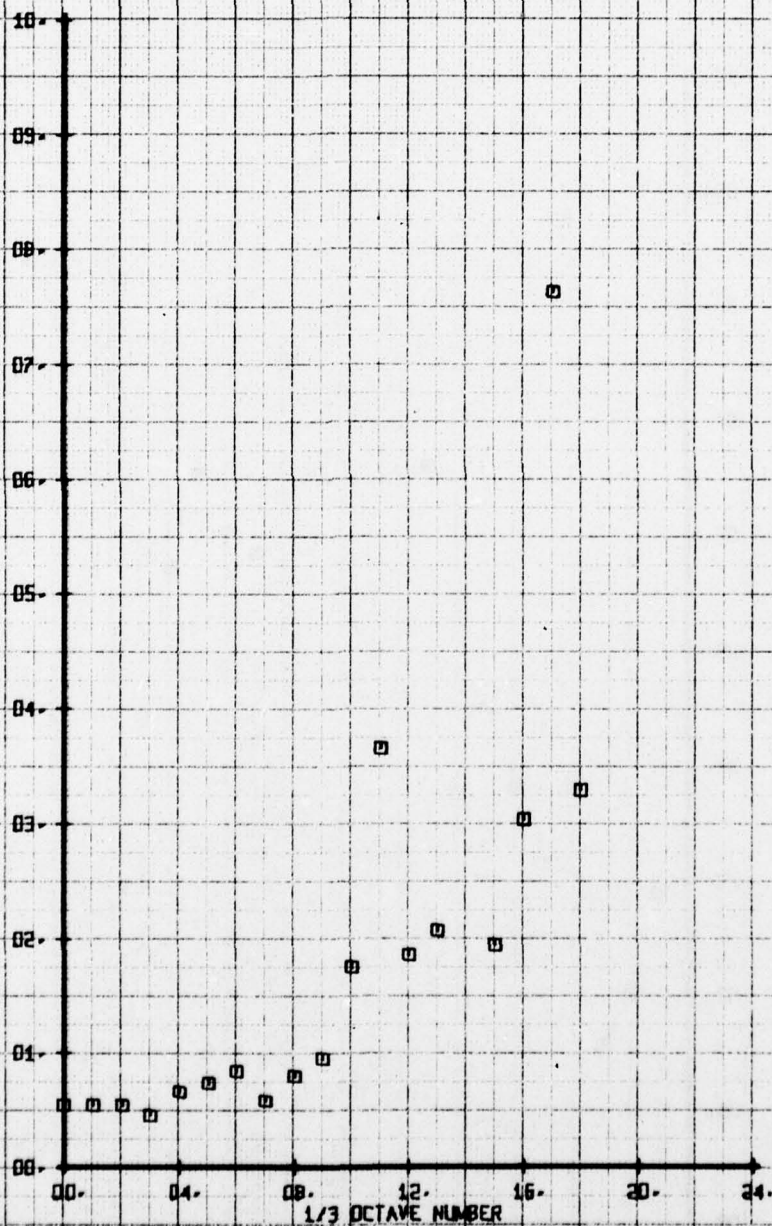
X-2 VELOCITY COMPONENT Y-BETA FBS



NOT FILM WAVE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60, 1.25G 20PSI BASIC E1
 RUN 195 TP 5

SYM	CH	PARAMETER
0	65	V-BETA

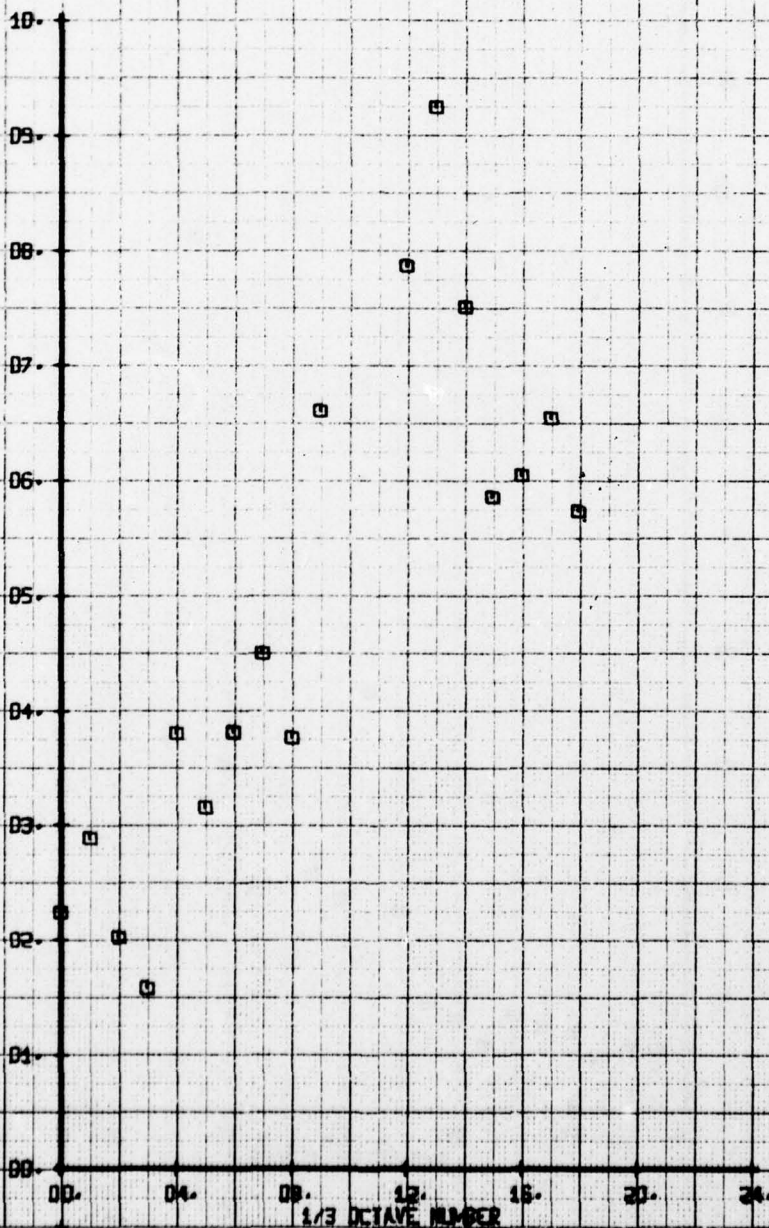
X-2 VELOCITY COMPONENT Y-BETA FBS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W UBDY 7.60, 1.25G, E1 40FST
 RUN 196 TP 1

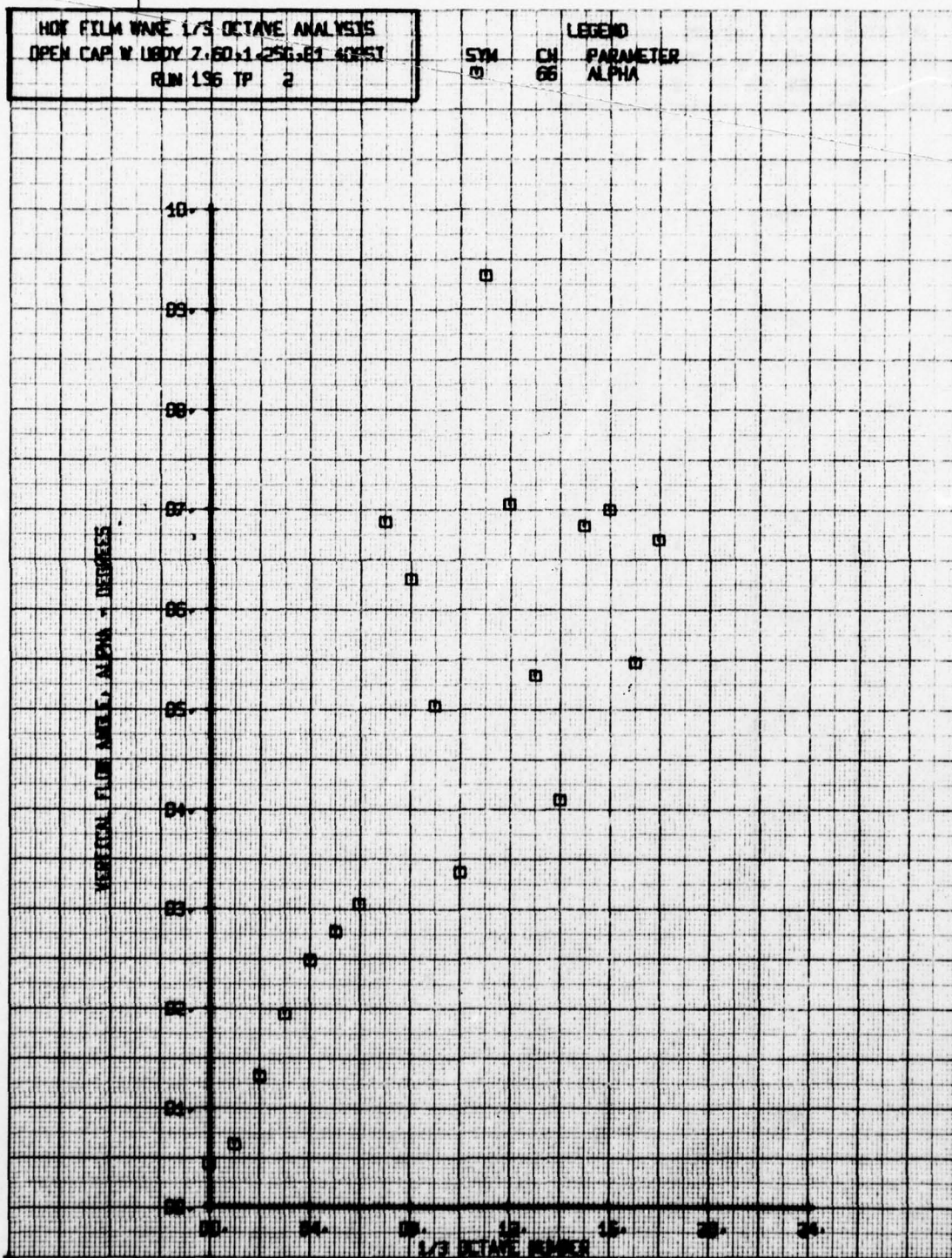
SYN CH
 66
 PARAMETER
 ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES



HOT FILM WAVE 1/3 OCTAVE ANALYSIS
 OPEN CAP W. BODY 7.60, 1.256, 81 40257
 RUN 196 TP 2

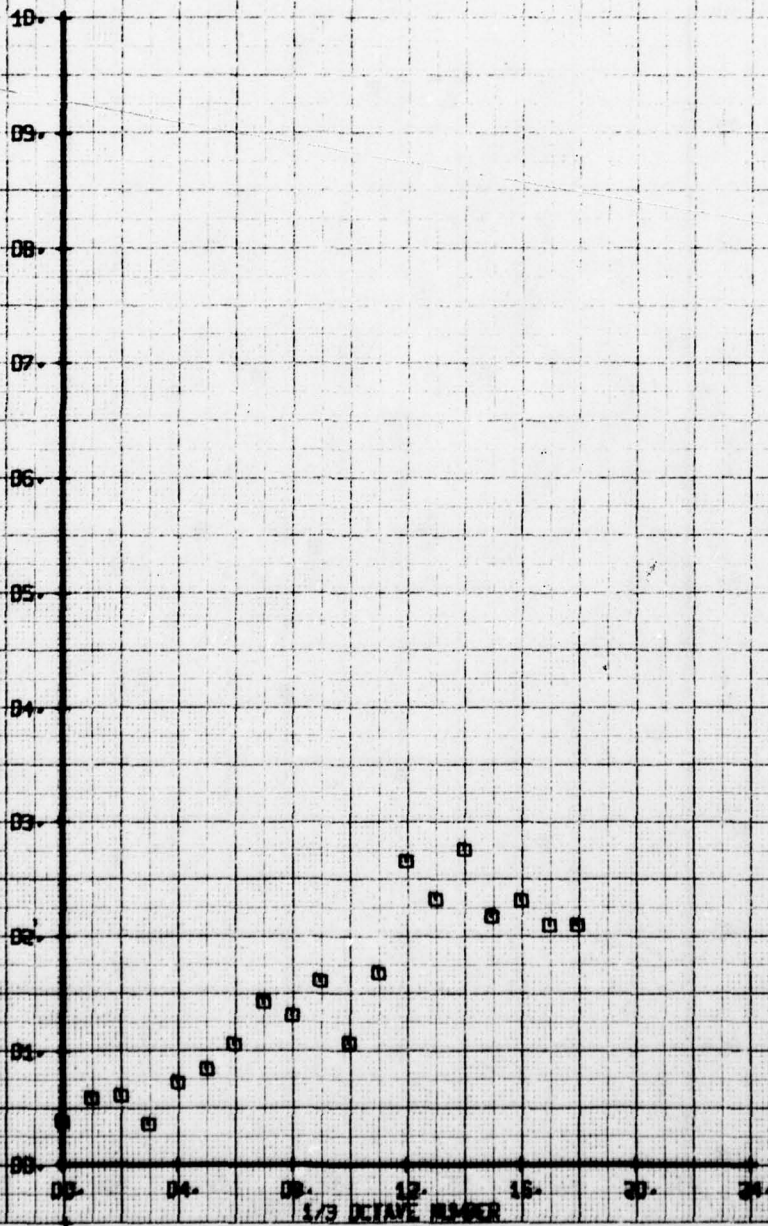
SYM CH PARAMETER
 0 66 ALPHA



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W BODY 7.60, 1.256, E1 40PSI
 RUN 196 TP 3

LEGEND
 SYM CH PARAMETER
 □ 66 ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES



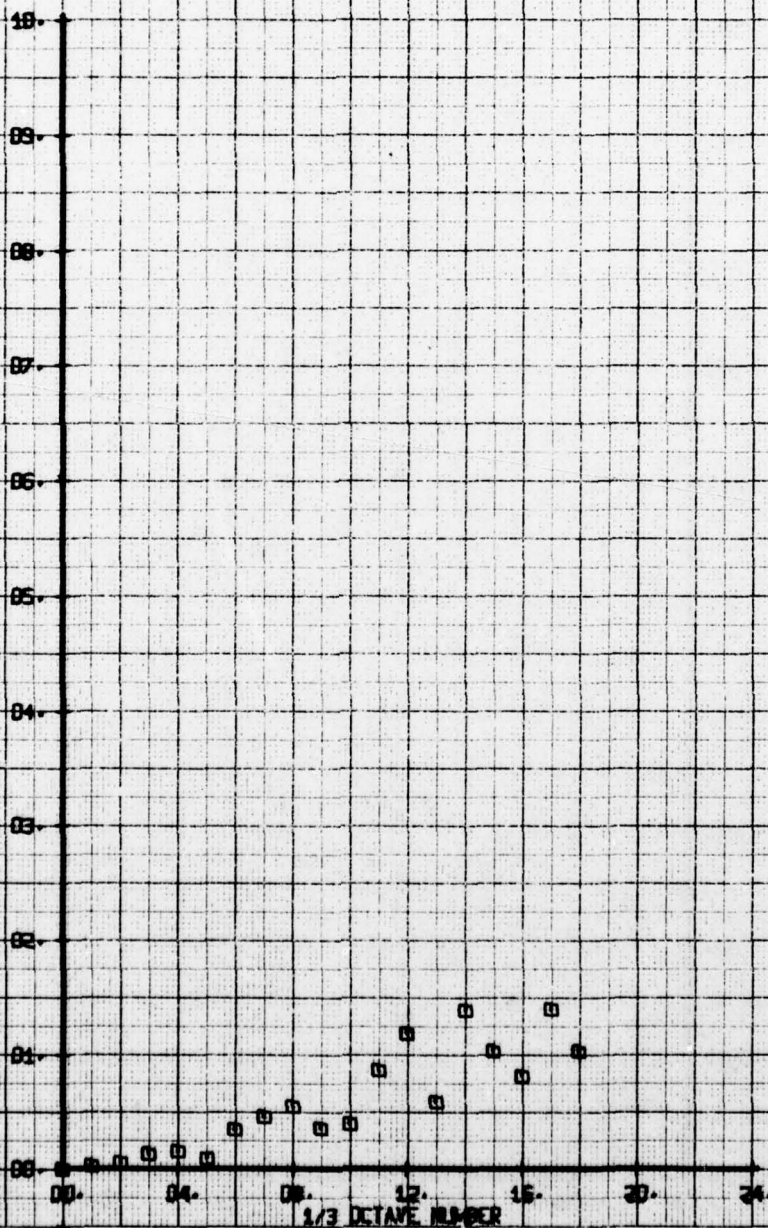
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CASE W LBDY 7.60:1.256.E1 40PSI
 RUN 156 TP 4

SYM
 0

CH
 66

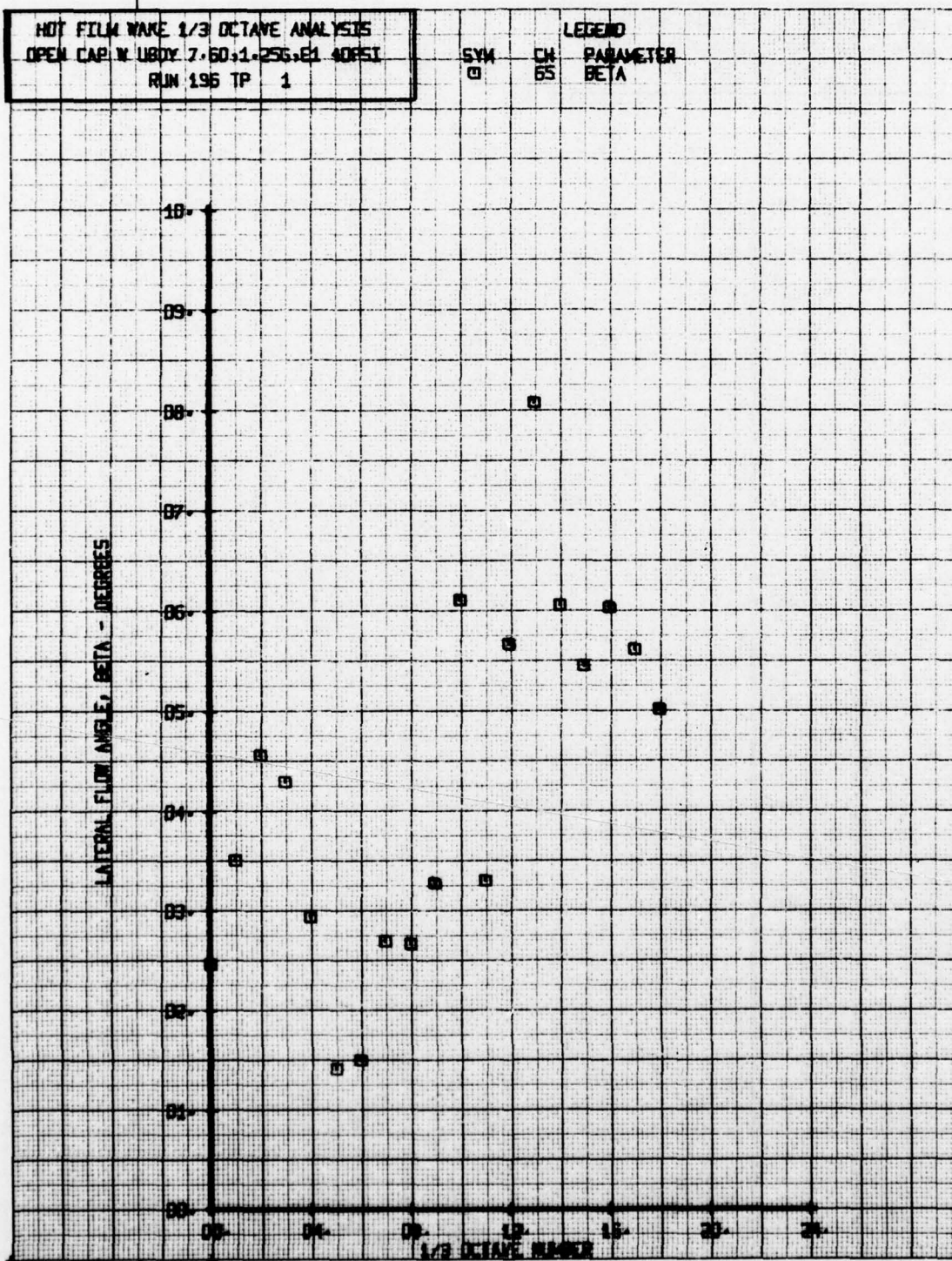
LEGEND
 PARAMETER
 ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES



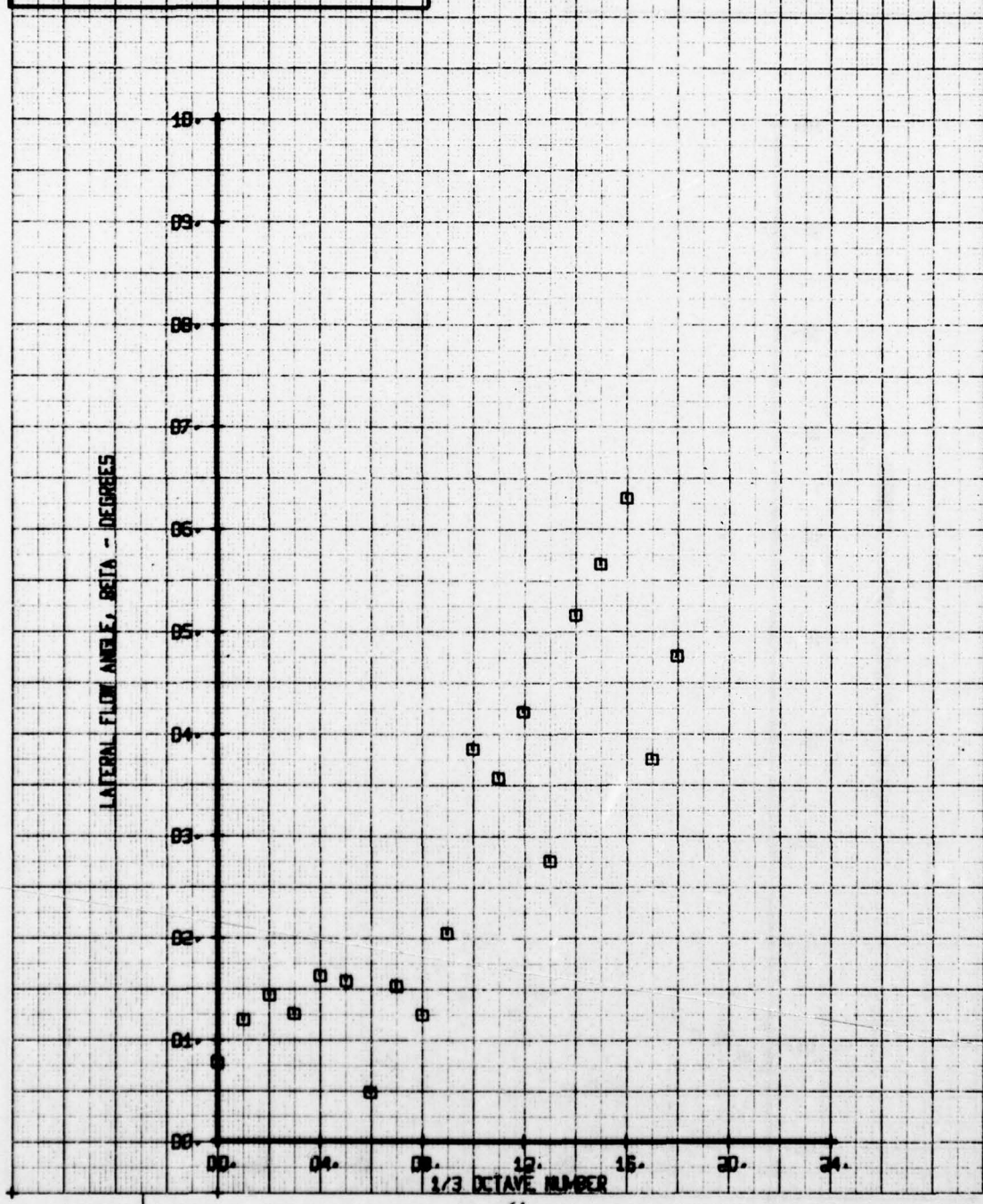
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W. UBDY 7.60, 1.25G, E1 40PSI
 RUN 196 TP 1

SYN CH PARAMETER
 0 65 BETA



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W BODY 7.60, 1.256, 61 40PSI
 RUN 195 TP 2

SYM	CH	PARAMETER
□	65	BETA



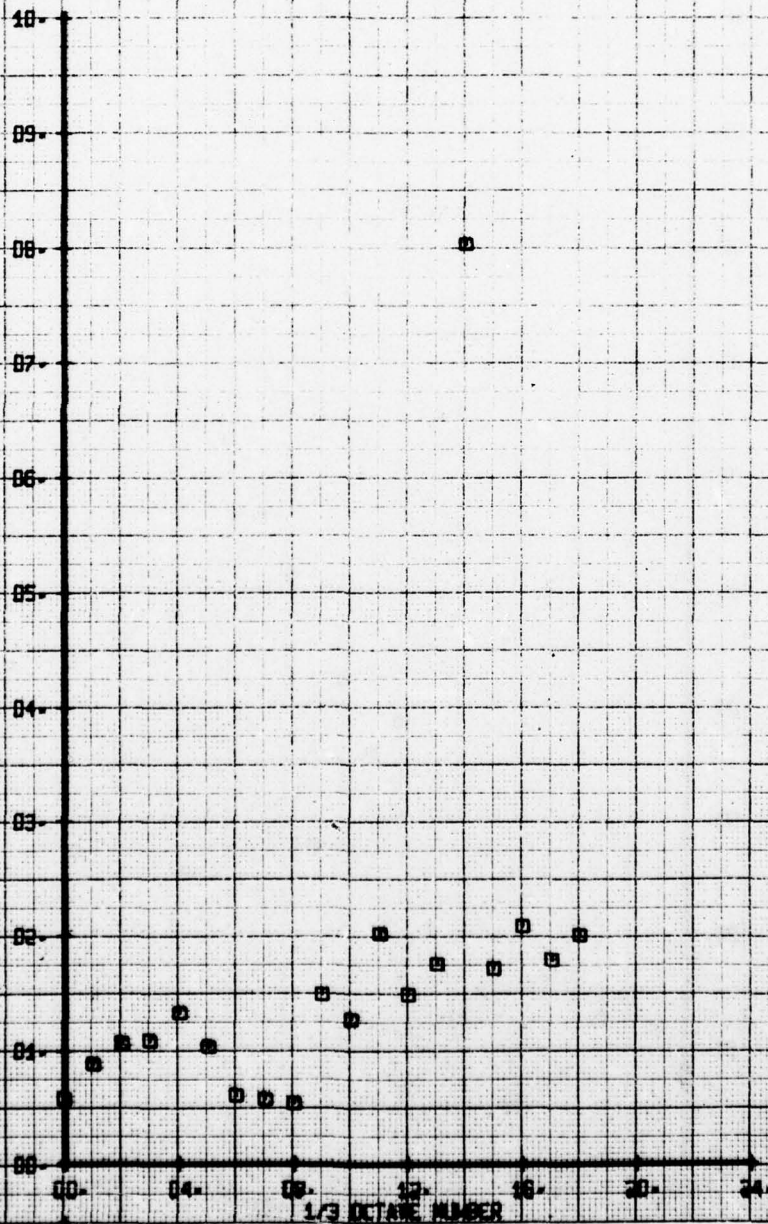
HOT FILM WARE 1/3 OCTAVE ANALYSIS
 OPEN CASE W BODY 2.60x1.25G.81 40PSI
 RUN 196 TP 3

SYM
 0

CH
 65

LEGEND
 PARAMETER
 BETA

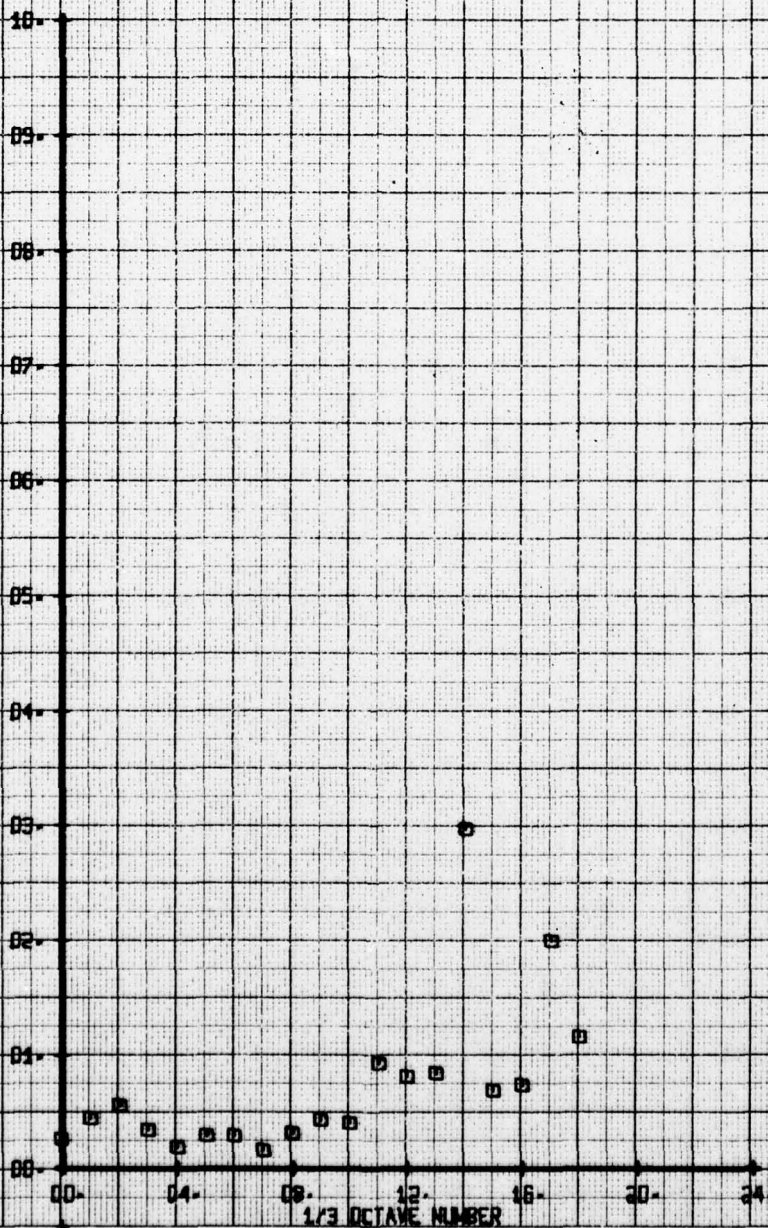
LATERAL FLOW ANGLE, BETA - DEGREES



HOT FILM WAVE 1/3 OCTAVE ANALYSIS
 OPEN CAP W. BODY 2.60-1.25G.E1 40PST
 RUN 196 TP 4

SYN CH PARAMETER
 0 65 BETA

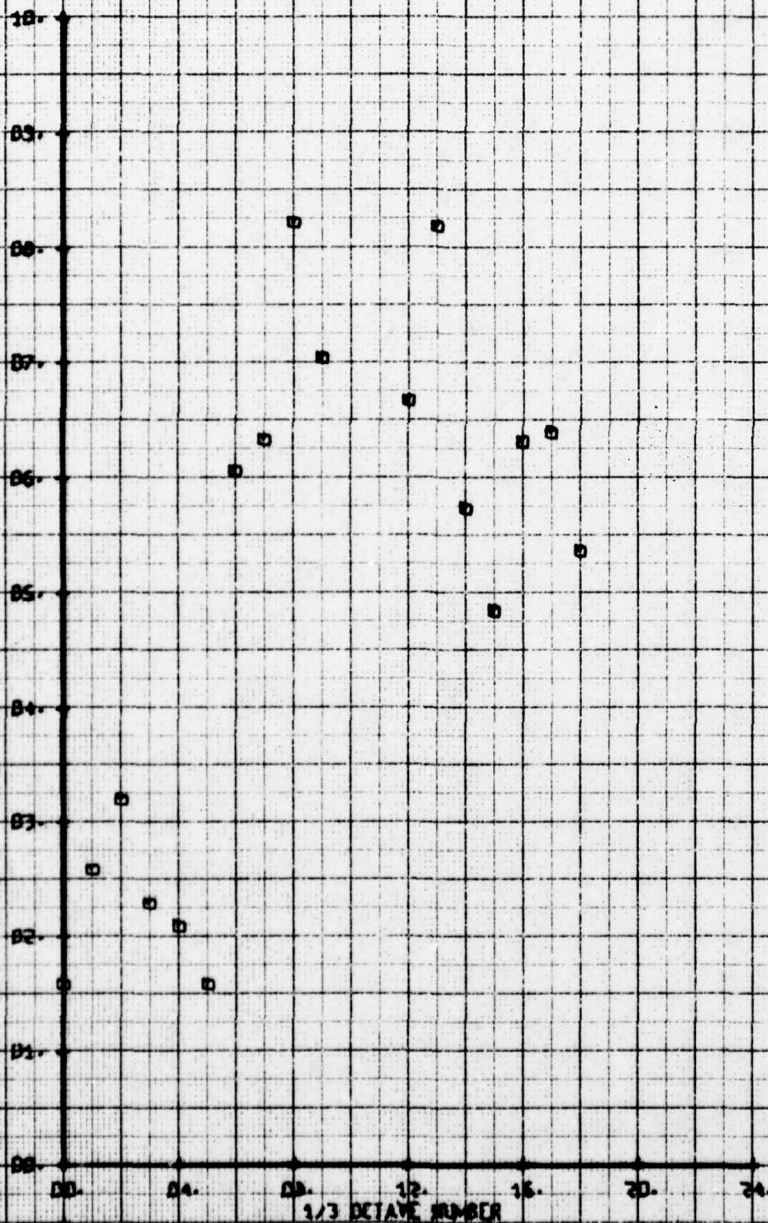
LATERAL FLOW ANGLE, BETA - DEGREES



NOY FILM NAME 1/3 OCTAVE ANALYSIS
 OPEN CAP W LBBY 2.60.1.25G.E1 A0851
 RUN 136 TP 2

SYM CH
 0 66
 LEGEND
 PARAMETER
 V-ALPHA

1/3 V-ALPHA COMPONENT V-ALPHA FFS

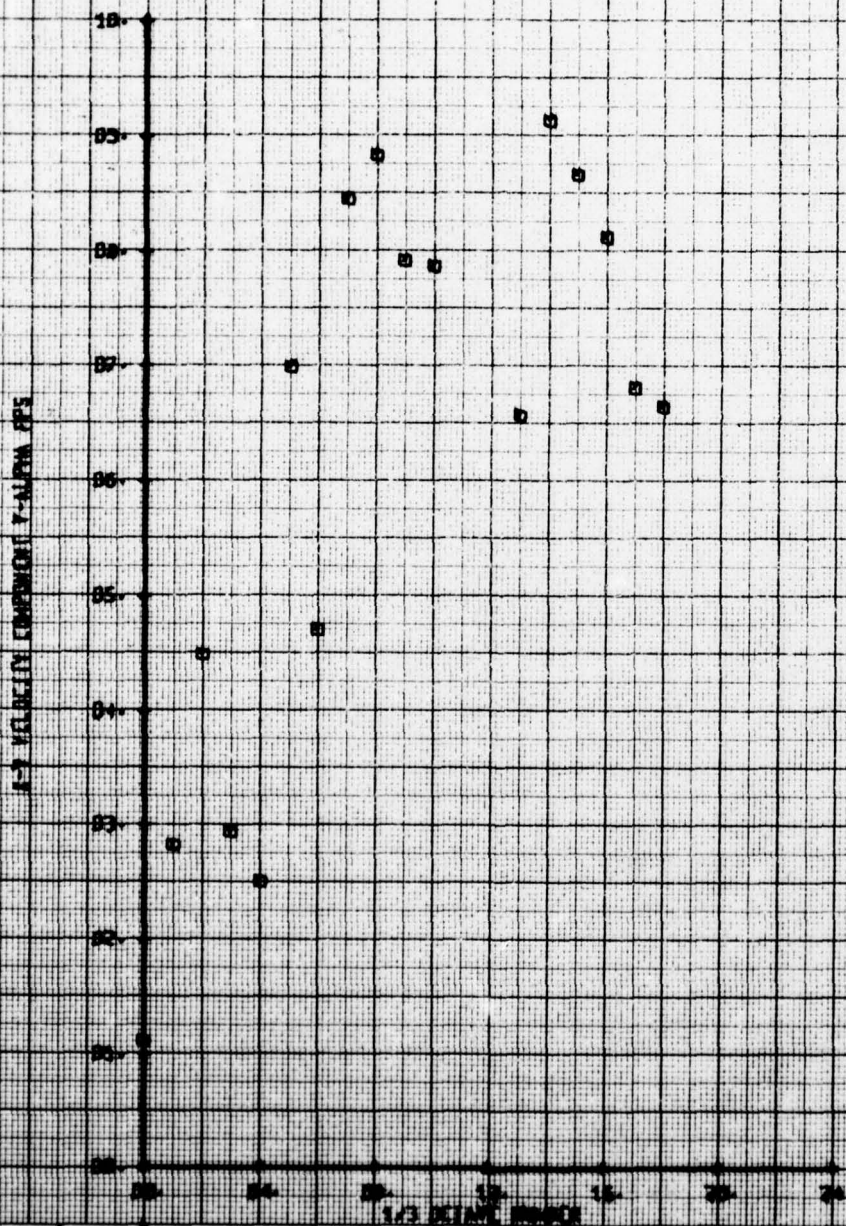


HOT FILM WIND 1/3 OCTAVE ANALYSIS
 OPEN CAP W WINDY 7.50:1.25G.E1 A0PS1
 RUN 135 TP 2

SYM
 0

CH
 66

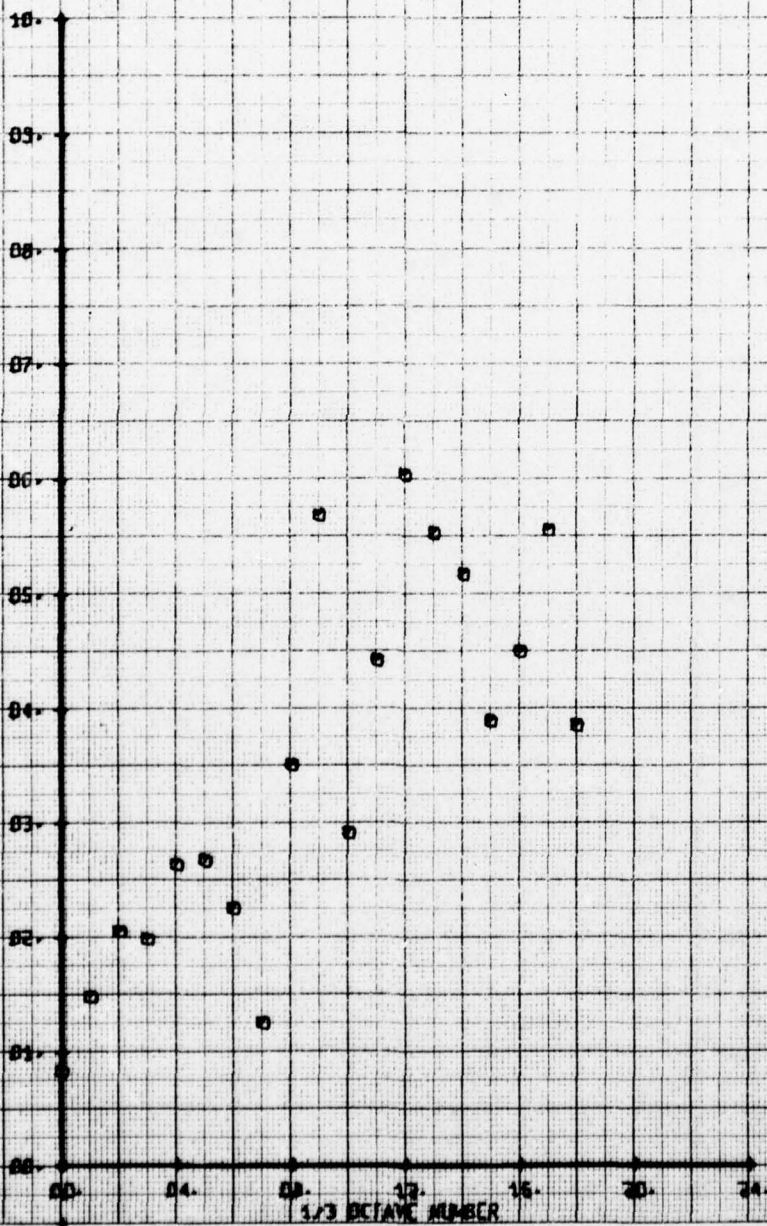
LEGEND
 PARAMETER
 V-ALPHA



HOT FILM WAVE 1/3 OCTAVE ANALYSIS
 OPEN CAP W BODY 7.60, 1.25G, E1 ADP51
 RUN 196 IP 3

LEGEND
 CH 66
 PARAMETER
 V-ALPHA

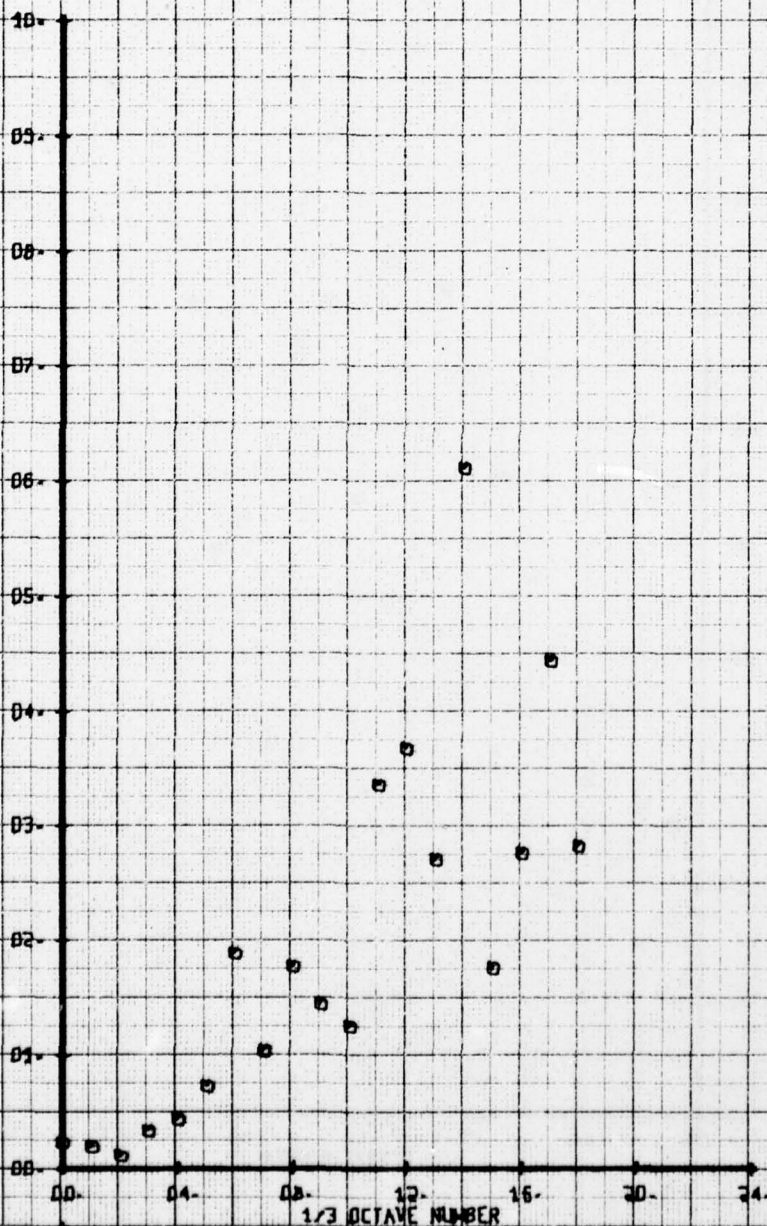
1/3 VELOCITY COMPONENT V-ALPHA RMS



NOT FILM WARE 1/3 OCTAVE ANALYSIS
 OPEN CASE W. BODY 2.60, 1.25G, 61 40PSI
 RUN 156 TP 4

SYM CH PARAMETER
 0 66 V-ALPHA

X-Y VELOCITY COMPONENT V-ALPHA EPS



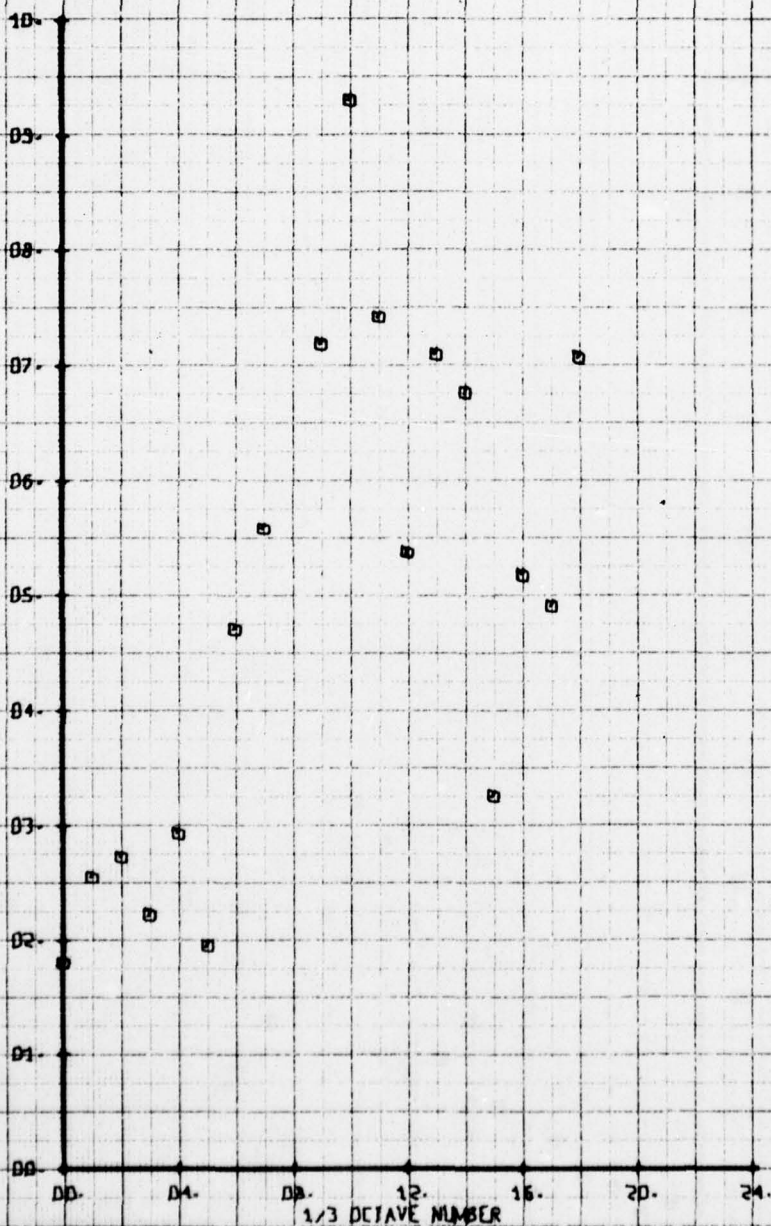
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W BODY 7.60, 1.256, 61 40PSI
 RUN 196 TP 1

SYM
 □

CH
 65

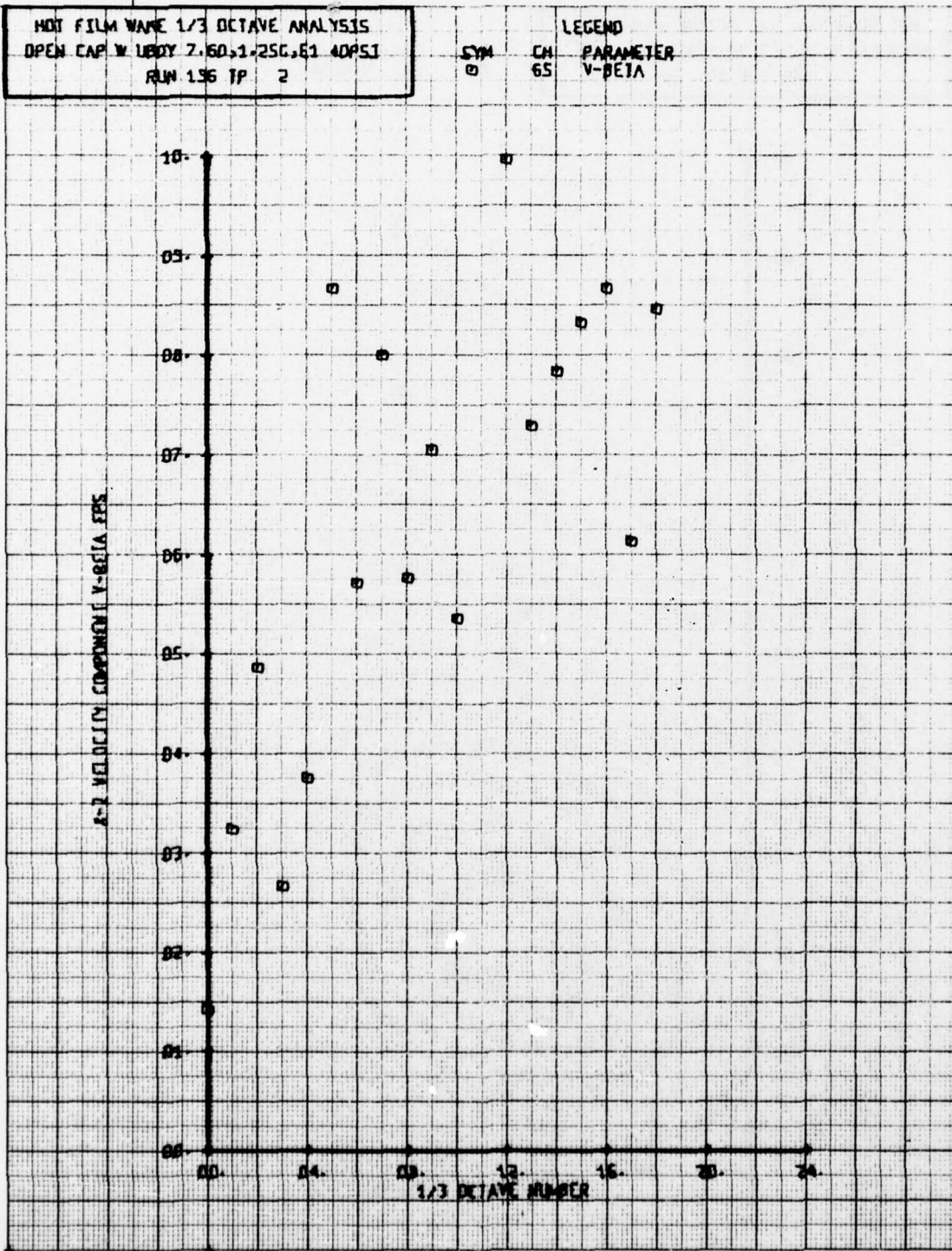
LEGEND
 PARAMETER
 V-BETA

A-2 VELOCITY COMPONENT V-BETA FPS



HOT FILM WAVE 1/3 OCTAVE ANALYSIS
 OPEN CAP W BODY 2.60, 1.25G, 61 40PSI
 RUN 196 TP 2

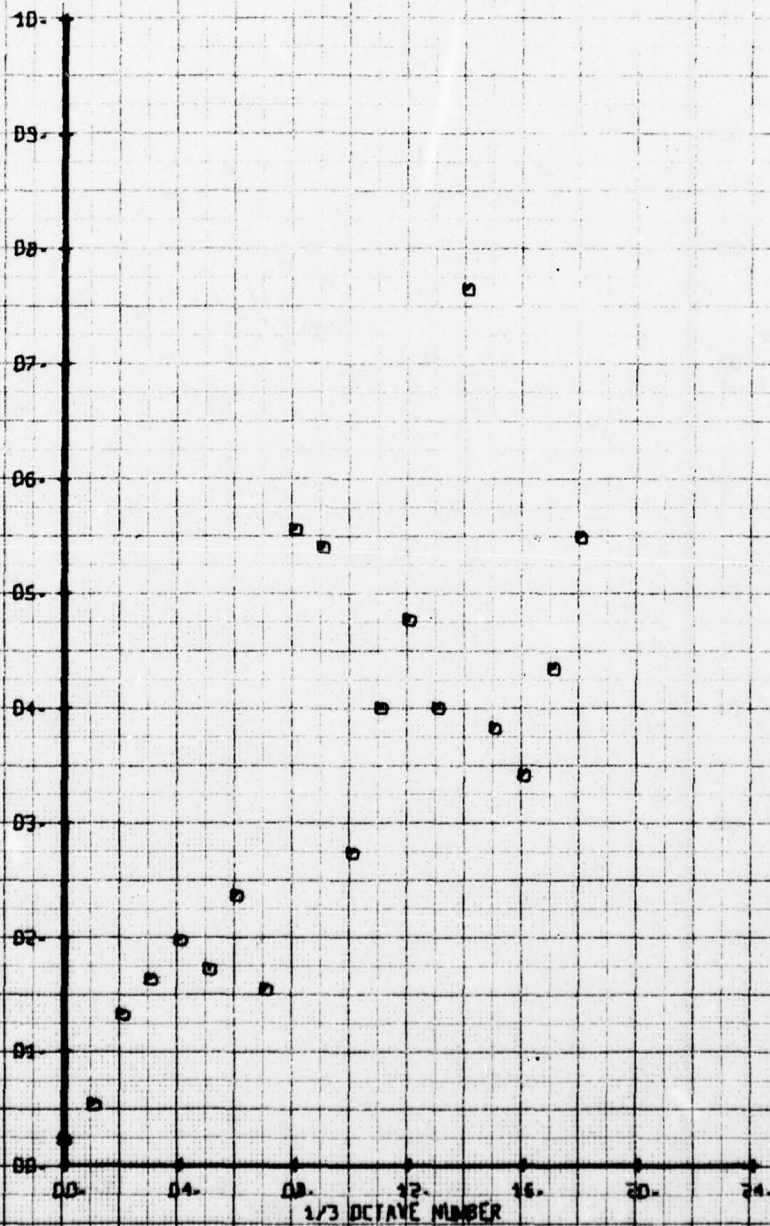
SYN CH PARAMETER
 0 65 V-DELTA



MOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W LIBBY 7-60, 1-25G, E1 40P51
 RUN 136 TP 3

LEGEND	
SYM	PARAMETER
□	V-BETA

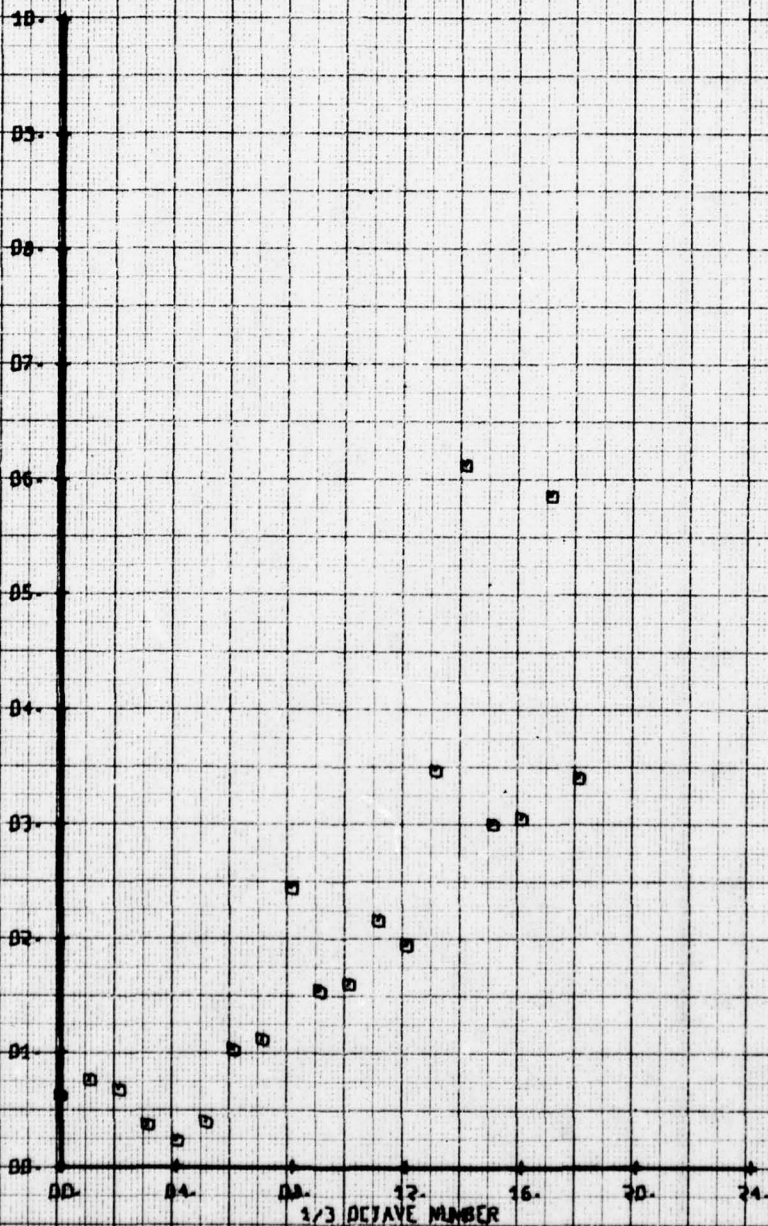
A-Z VELOCITY COMPONENT V-BETA FFS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W LIBDY 7.60, 1.25G, E1 ADPST
 RUN 136 TP 4

LEGEND
 SYM CH PARAMETER
 □ 6S V-BETA

A-7 VELOCITY COMPONENT K-BETA 115

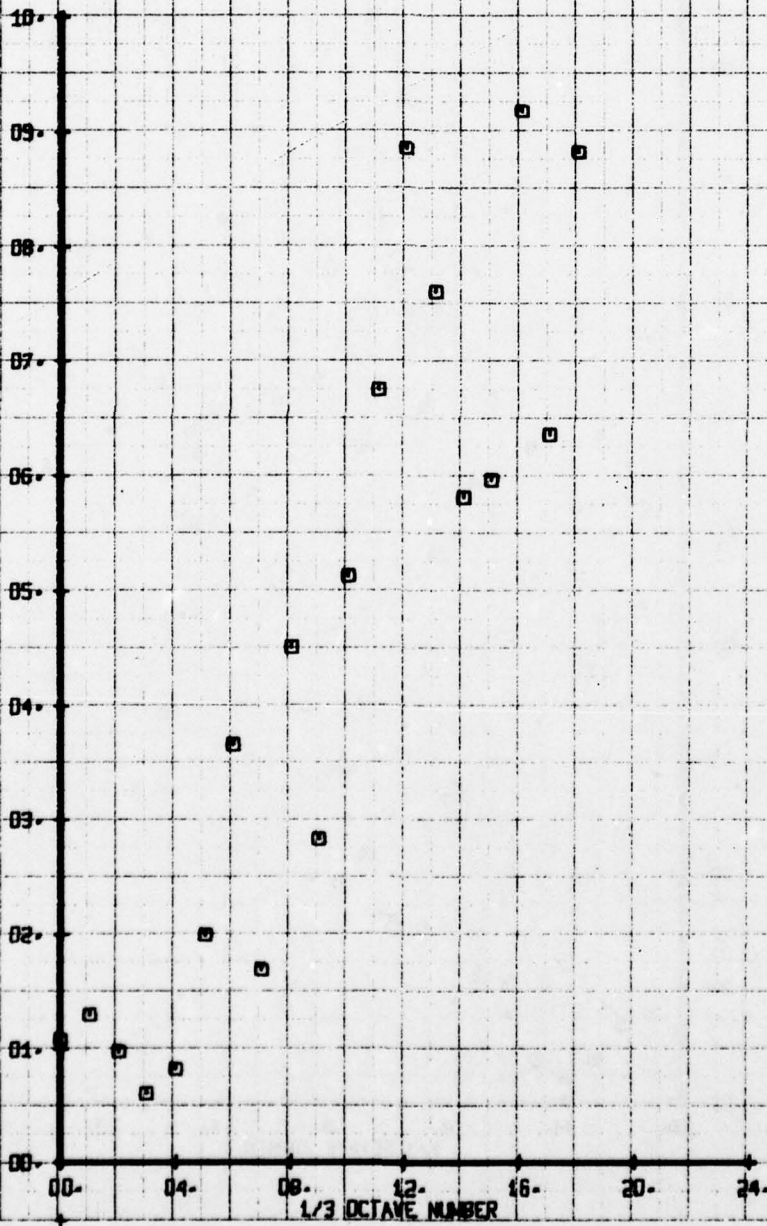


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60, 1.25G 150PSI BASIC E1
 RUN 197 TP 1

6VM
 CH
 66
 ALPHA

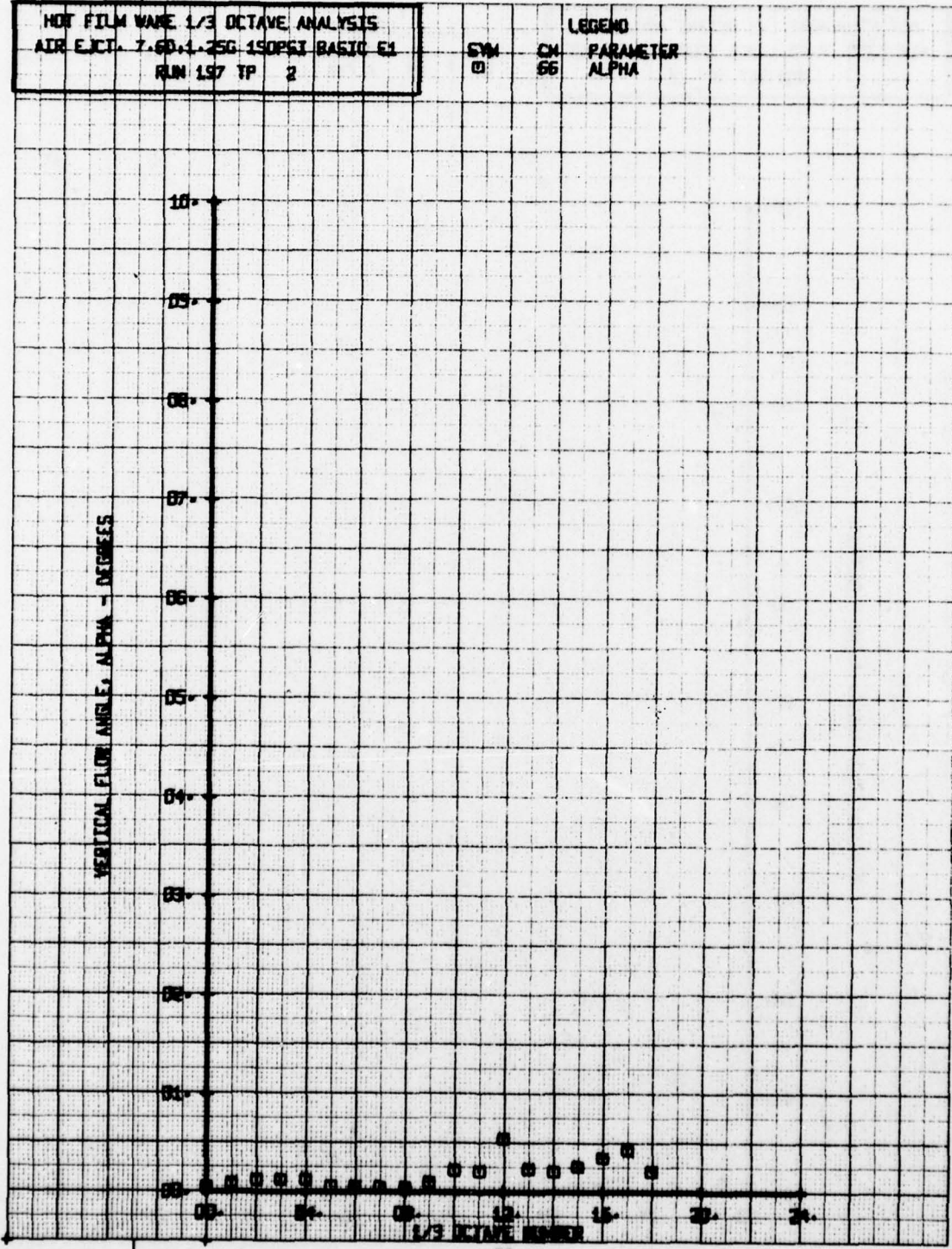
LEGEND
 PARAMETER
 ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECT 7.60 1.25G 150PSI BASIC E1
 RUN 197 TP 2

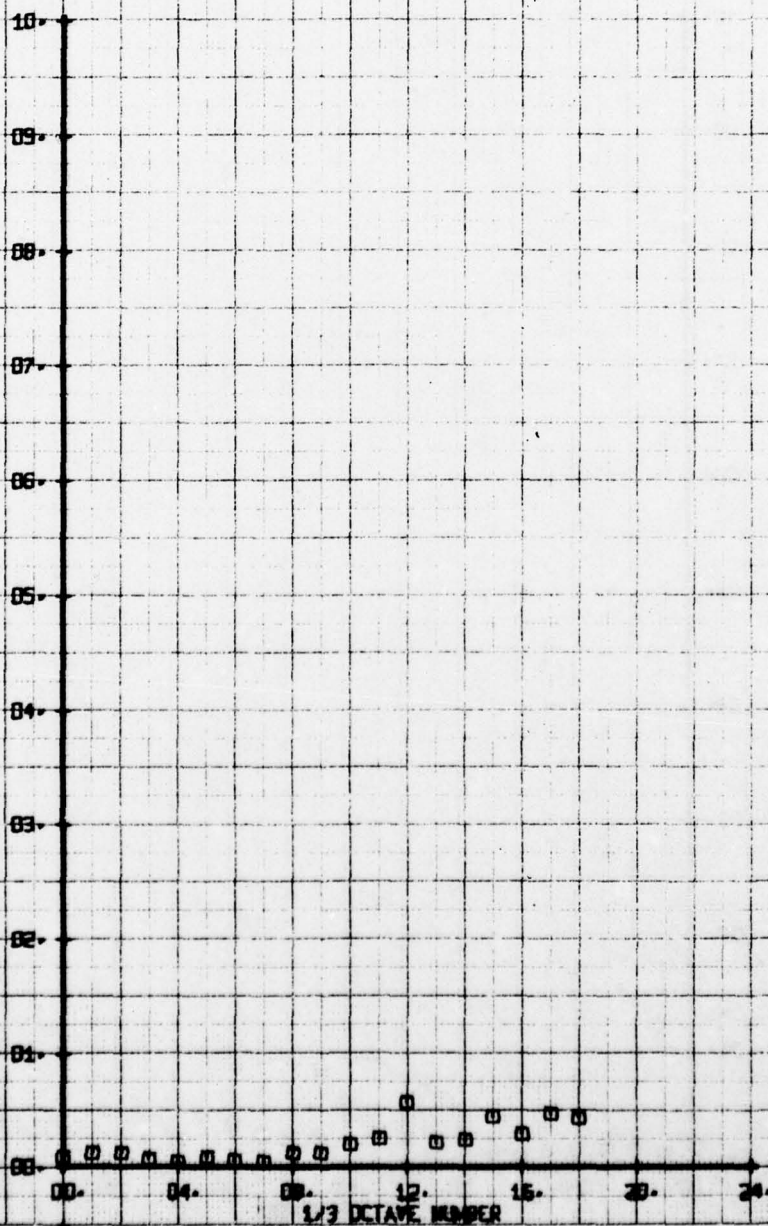
SWM CH PARAMETER
 0 66 ALPHA

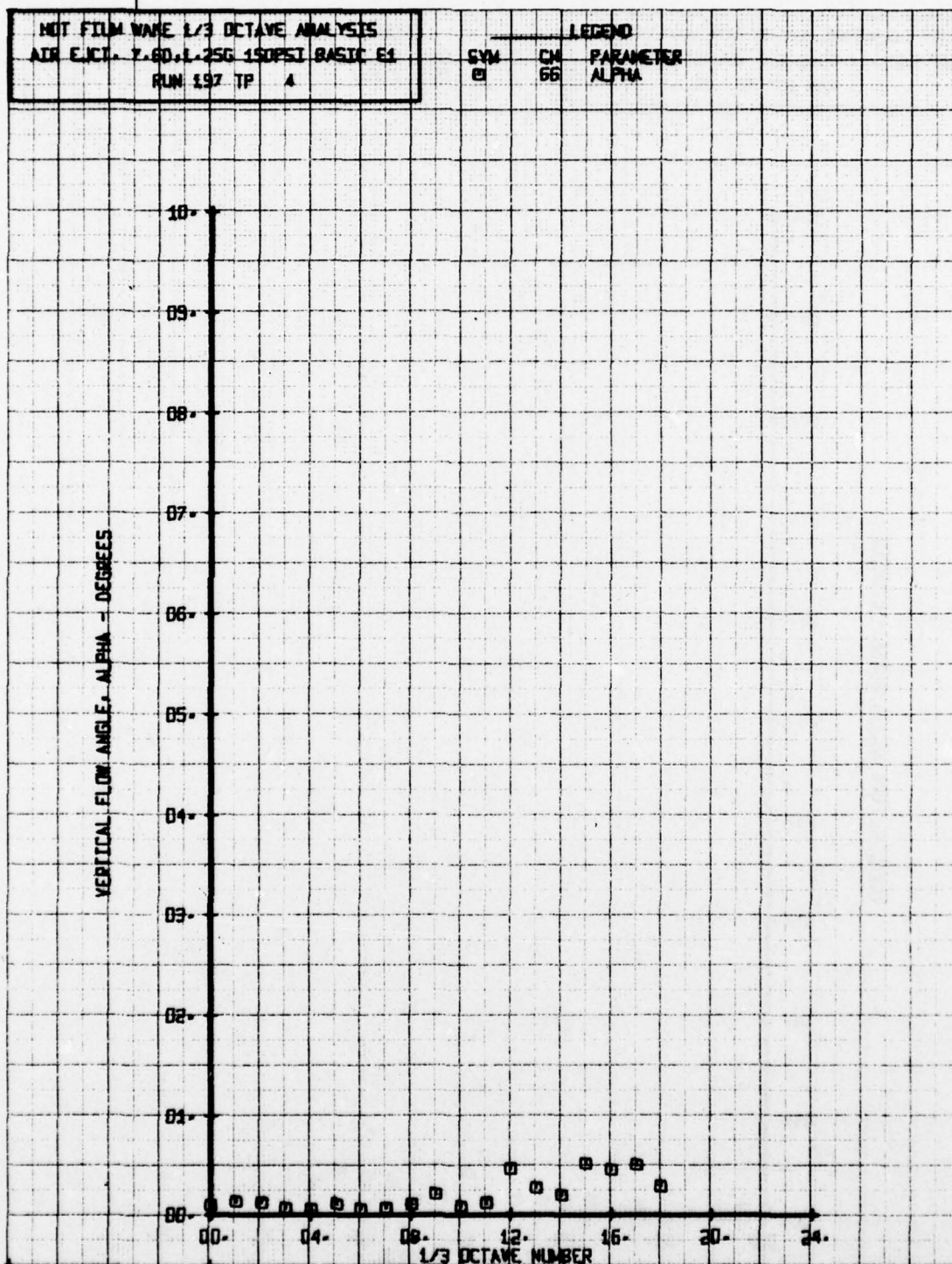


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60, 1.25G 150PSI BASTIC E1
 RUN 197 TP 3

LEGEND
 CH 66
 PARAMETER
 ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES

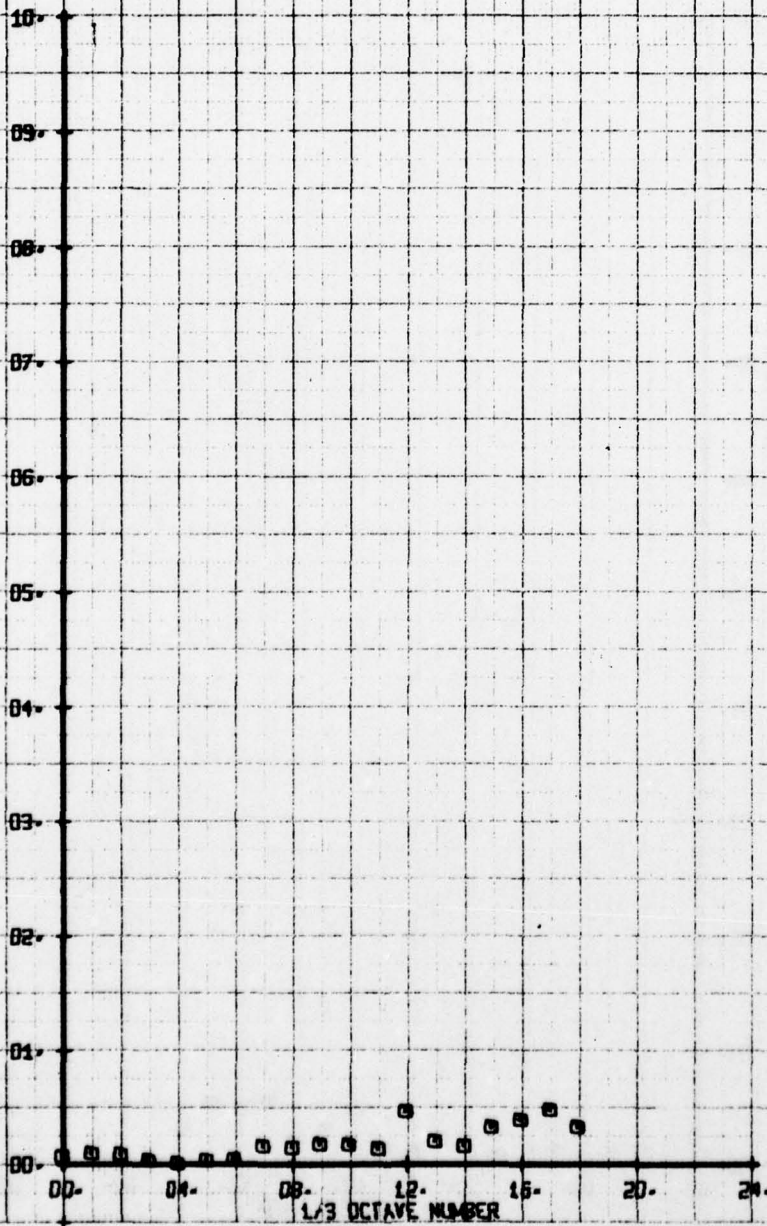




HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR ENCL. 7.60.4.25G 150PSI BASIC E1
 RUN 197 TP 5

SYM CH
 0 66
 PARAMETER
 ALPHA

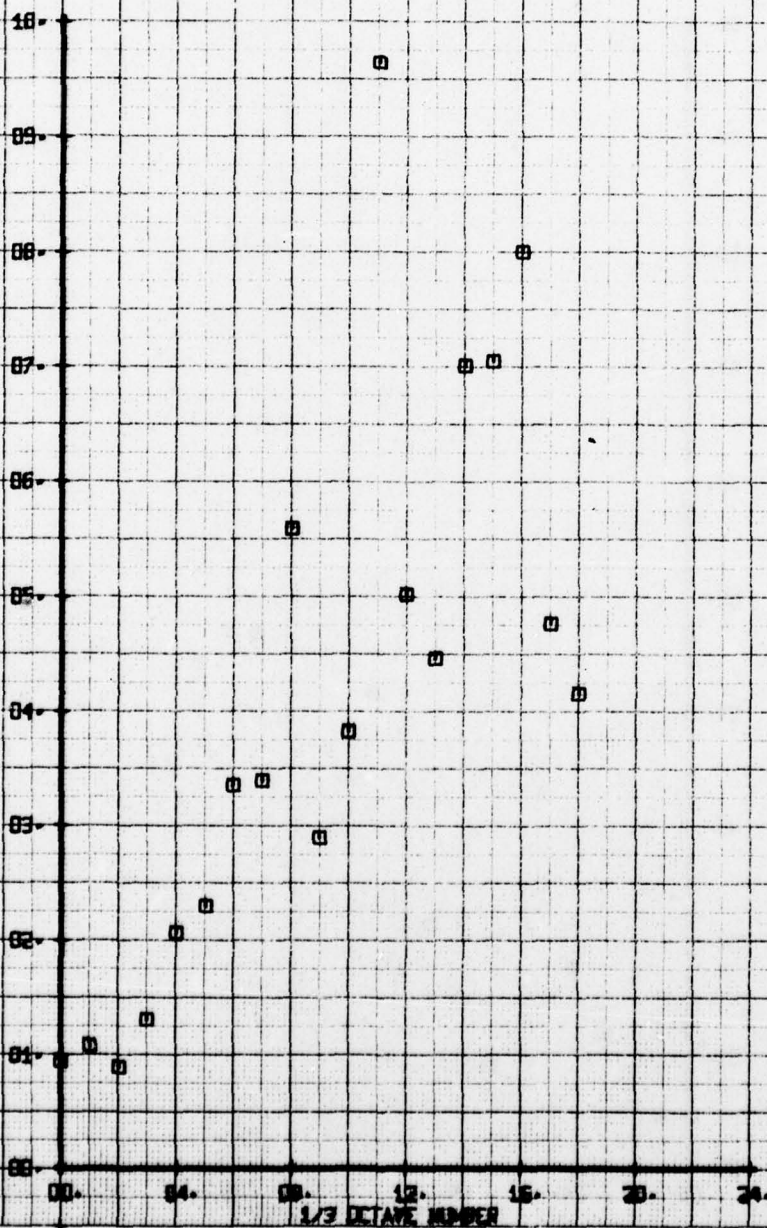
VERTICAL FLOW ANGLE, ALPHA - DEGREES



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60, 1.25G 150PSI BASIC E1
 RUN 197 TP 1

SYN CH PARAMETER
 0 65 BETA

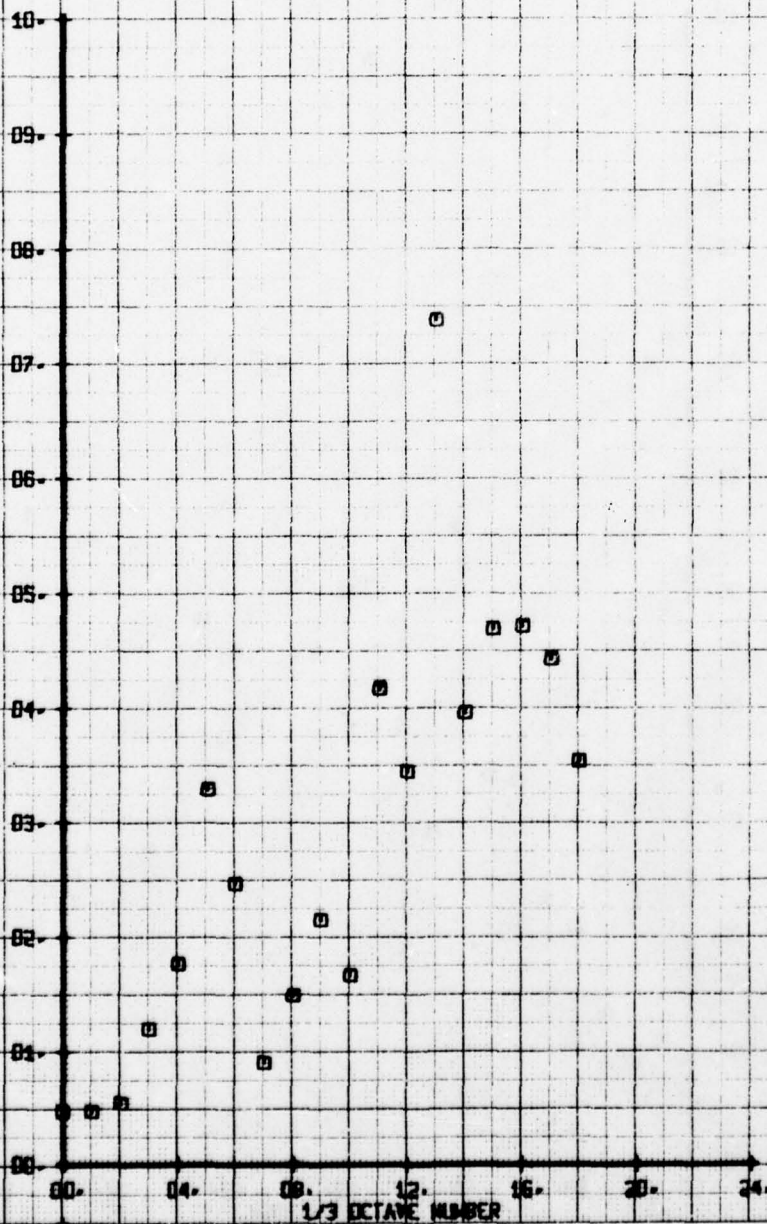
LATERAL FLOW ANGLE, BETA - DEGREES



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.80.1.25G 150PSI BASIC E1
 RUN 197 TP 2

LEGEND
 CH 65
 PARAMETER
 BETA

LATERAL FLOW ANGLE, BETA - DEGREES



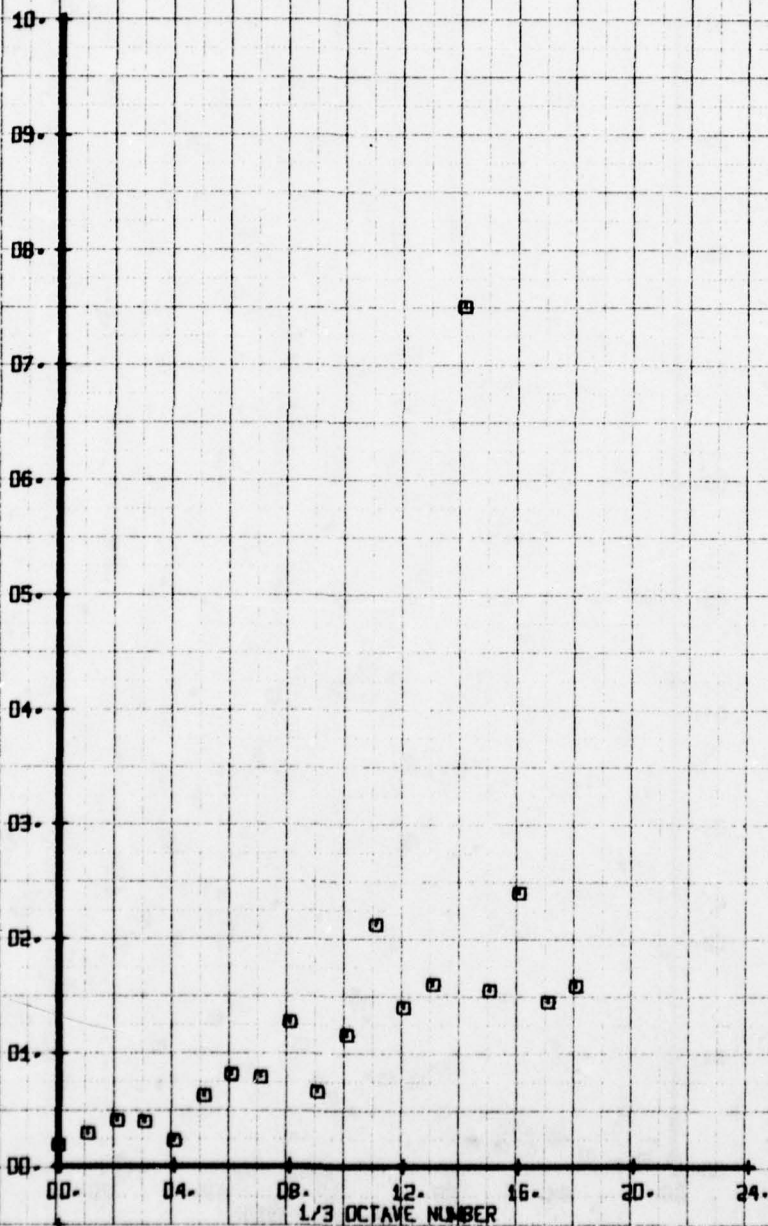
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR ECT. 7.60, 1.25G 150PST BASIC E1
 RUN 197 TP 3

SYM
 □

CH
 65

LEGEND
 PARAMETER
 BETA

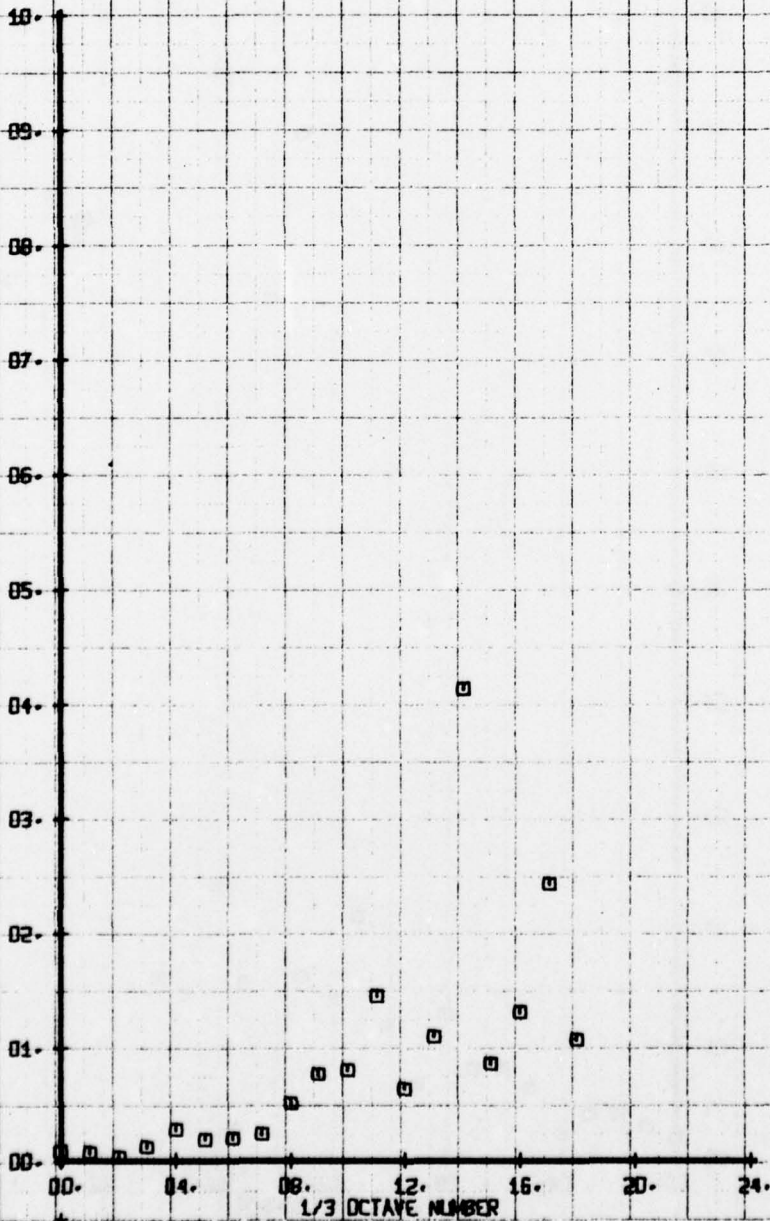
LATERAL FLOW ANGLE, BETA - DEGREES



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60.1.25G 150PSI BASIC E1
 RUN 197 TP 4

LEGEND
 CH 65
 PARAMETER
 BETA

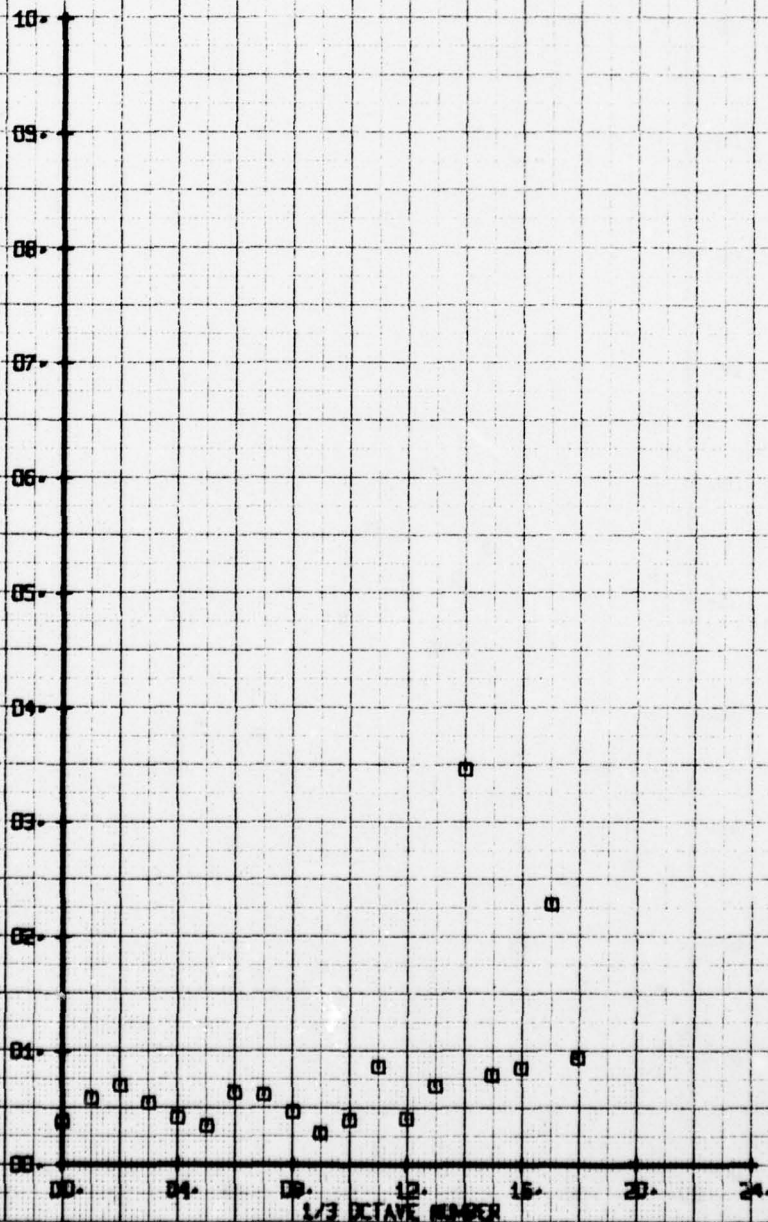
LATERAL FLOW ANGLE, BETA - DEGREES



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60.1.25G 150PSI BASIC E1
 RUN 197 TP 5

SYN CH PARAMETER
 0 65 BETA

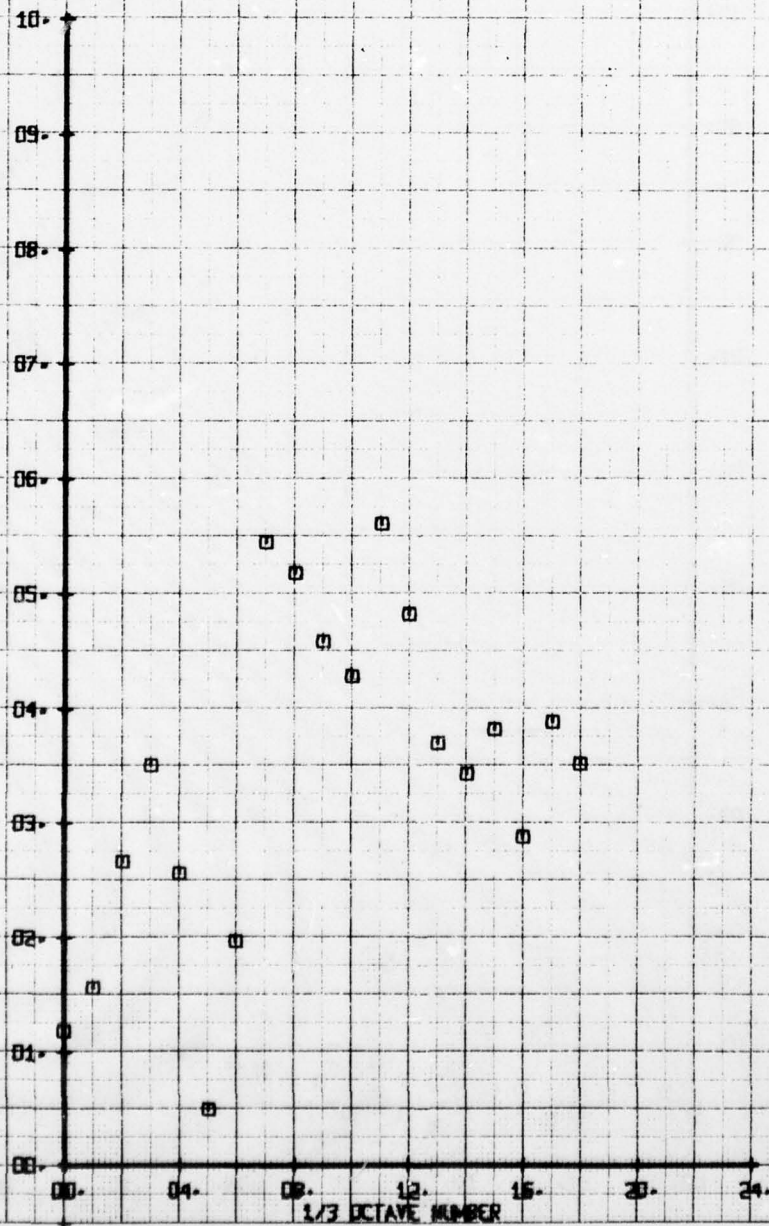
LATERAL FLOW ANGLE, BETA - DEGREES



HOT FILM WARE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60+1.25G 150PSI BASIC E1
 RUN 197 TP 1

SVM	CM	LEGEND
0	66	PARAMETER
		V-ALPHA

X-Y VELOCITY COMPONENT V-ALPHA FPS

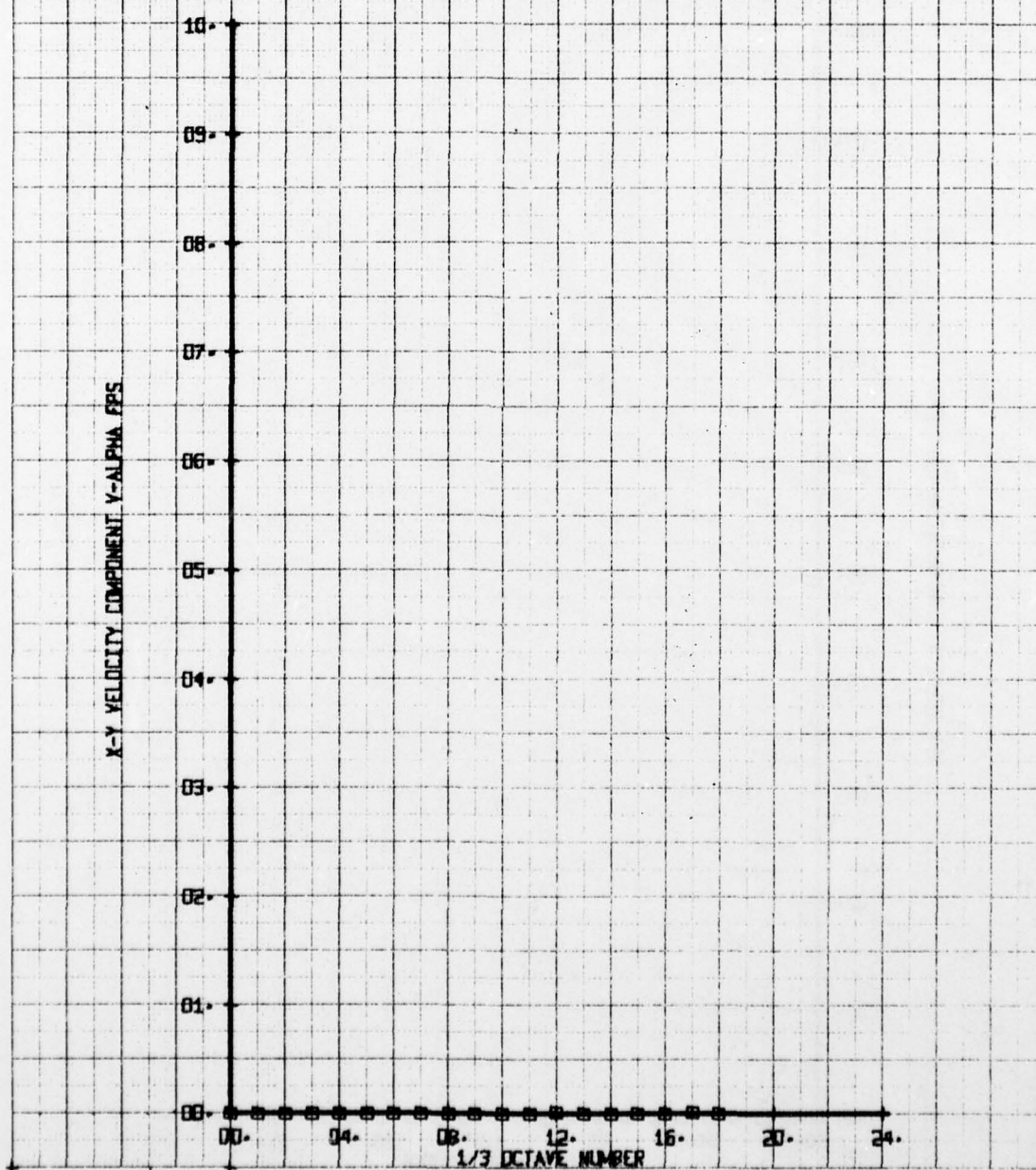


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60, 1.25G 150PSI BASIC E1
 RUN 157 TP 2

SYM
 0

CH
 66

LEGEND
 PARAMETER
 V-ALPHA



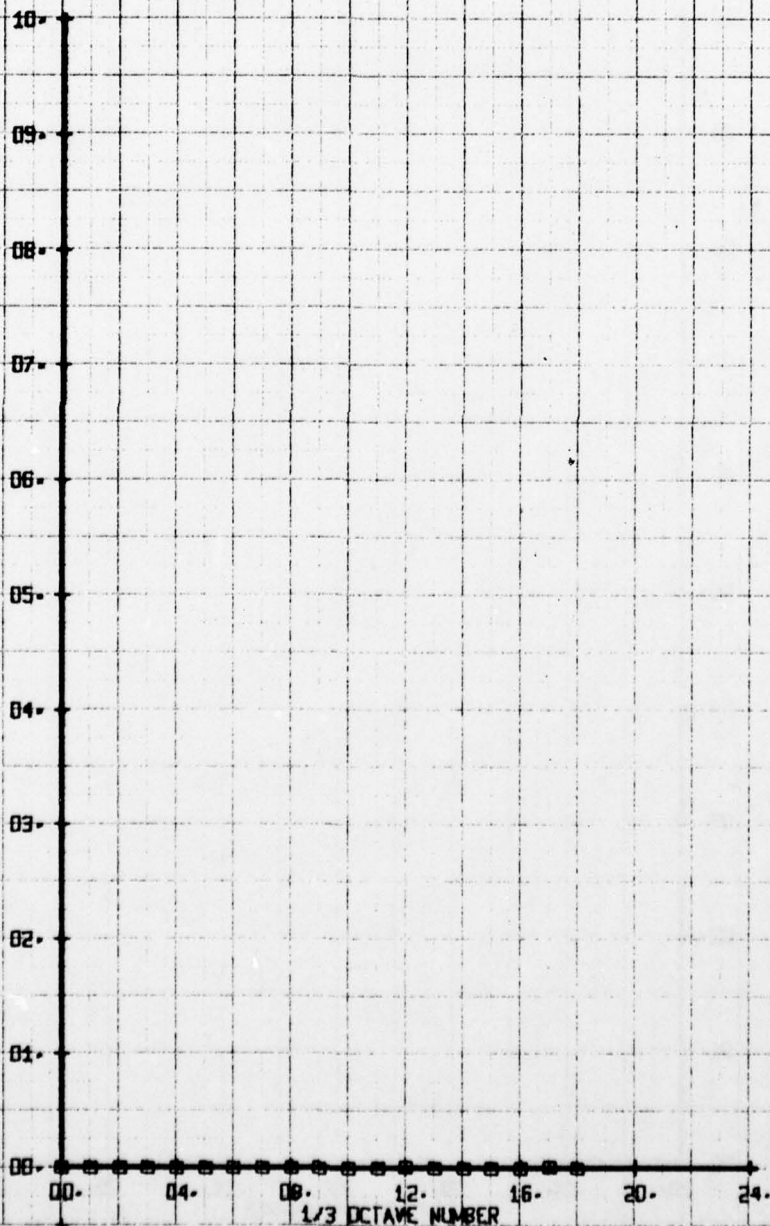
HOT FILM WARE 1/3 OCTAVE ANALYSIS
AIR EJECT. 7.60.1.25G 150PSI BASIC E1
RUN 197 TP 9

SYM
0

CH
66

LEGEND
PARAMETER
V-ALPHA

X-Y VELOCITY COMPONENT Y-ALPHA FPS

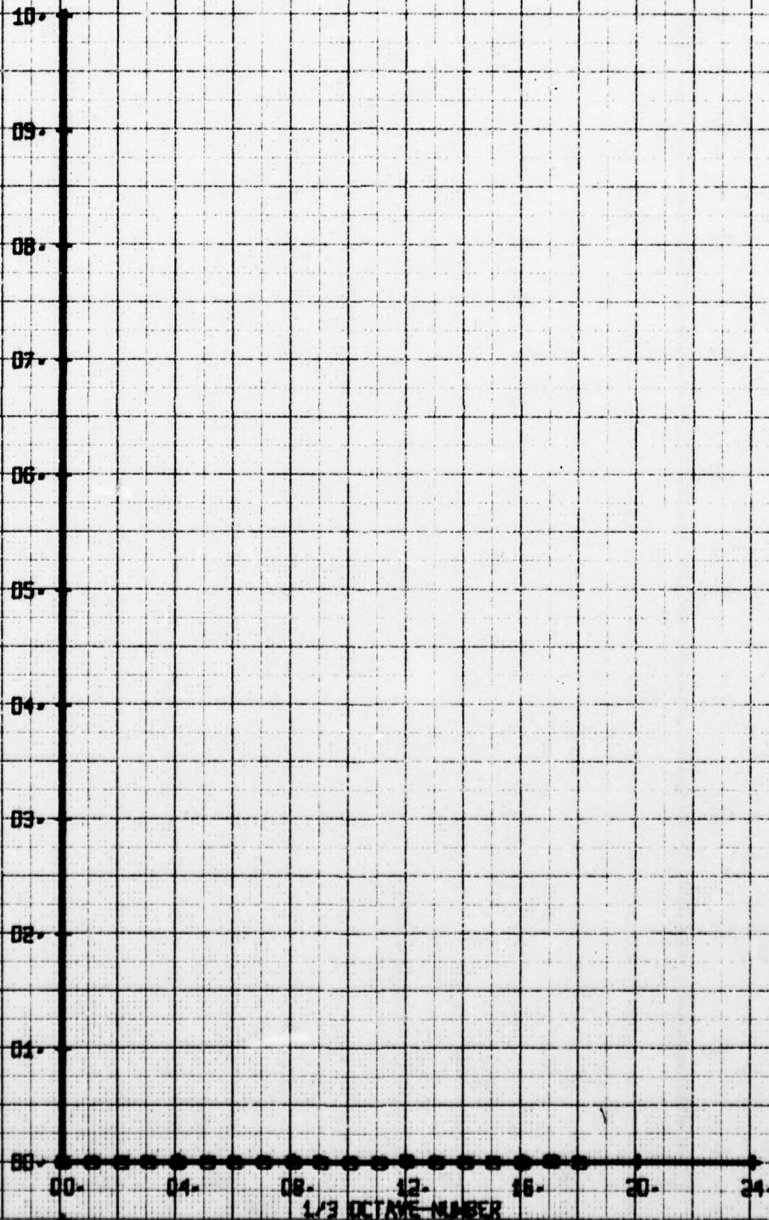


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60, 1.25G 150PSI BASIC E4
 RUN 197 TP 4

SYM
 □

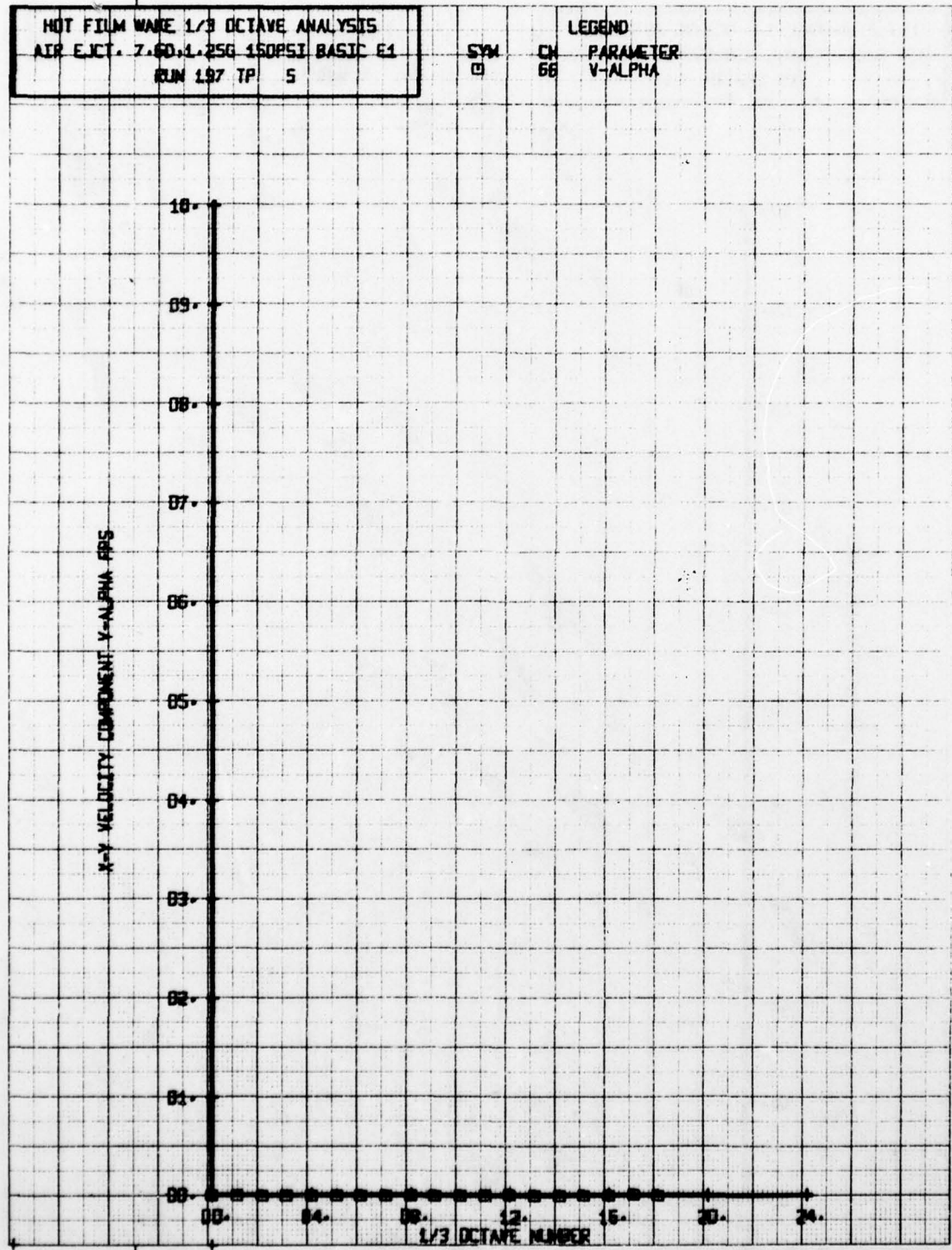
LEGEND
 CM 66
 PARAMETER
 V-ALPHA

X-Y VELOCITY COMPONENT V-ALPHA FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60, 1.25G 150PSI BASIC E1
 RUN 197 TP 5

SYN CH LEGEND
 0 66 PARAMETER
 V-ALPHA

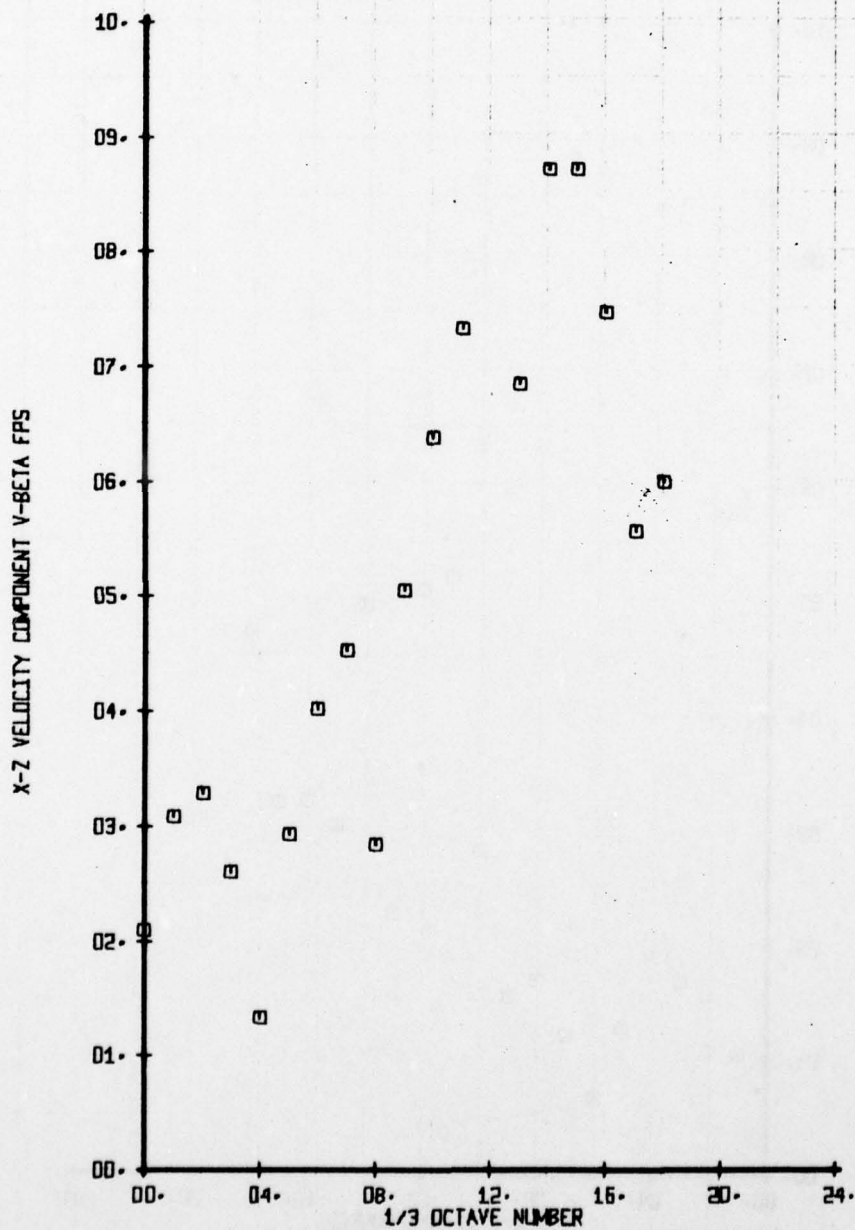


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60, 1.25G 150PSI BASIC E1
 RUN 197 TP 1

SYM
 □

CM
 65

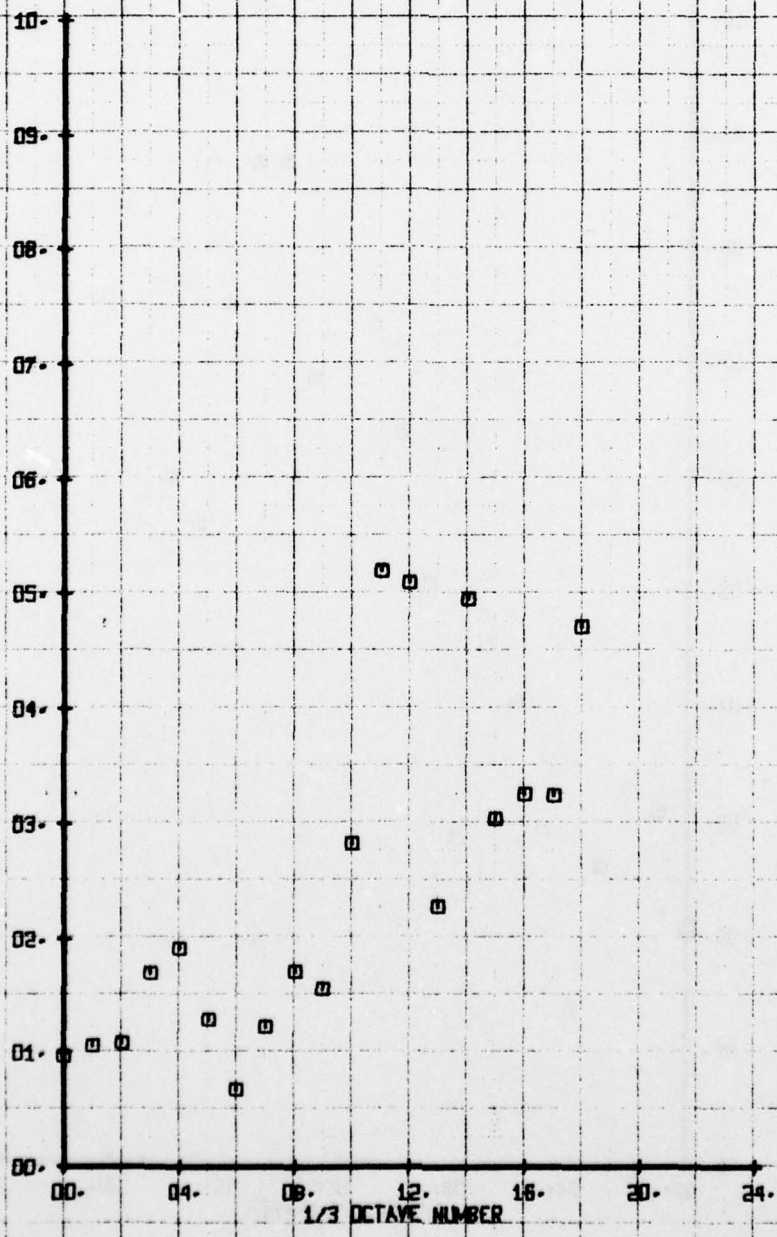
LEGEND
 PARAMETER
 V-BETA



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECT - 7.60, 1-25G-150PSI BASIC E1
 RUN 197 TP 3

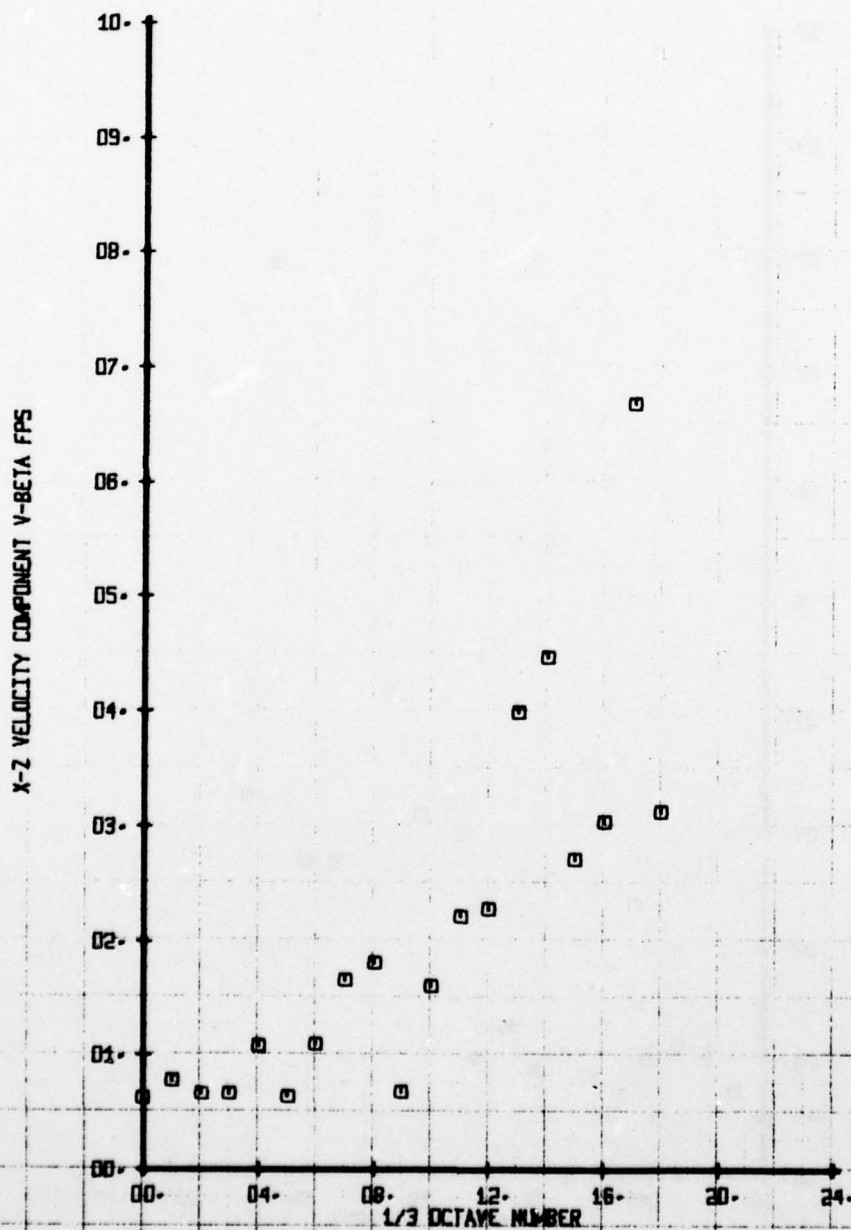
SYM	CH	PARAMETER
□	65	V-BETA

X-Z VELOCITY COMPONENT V-BETA FPS



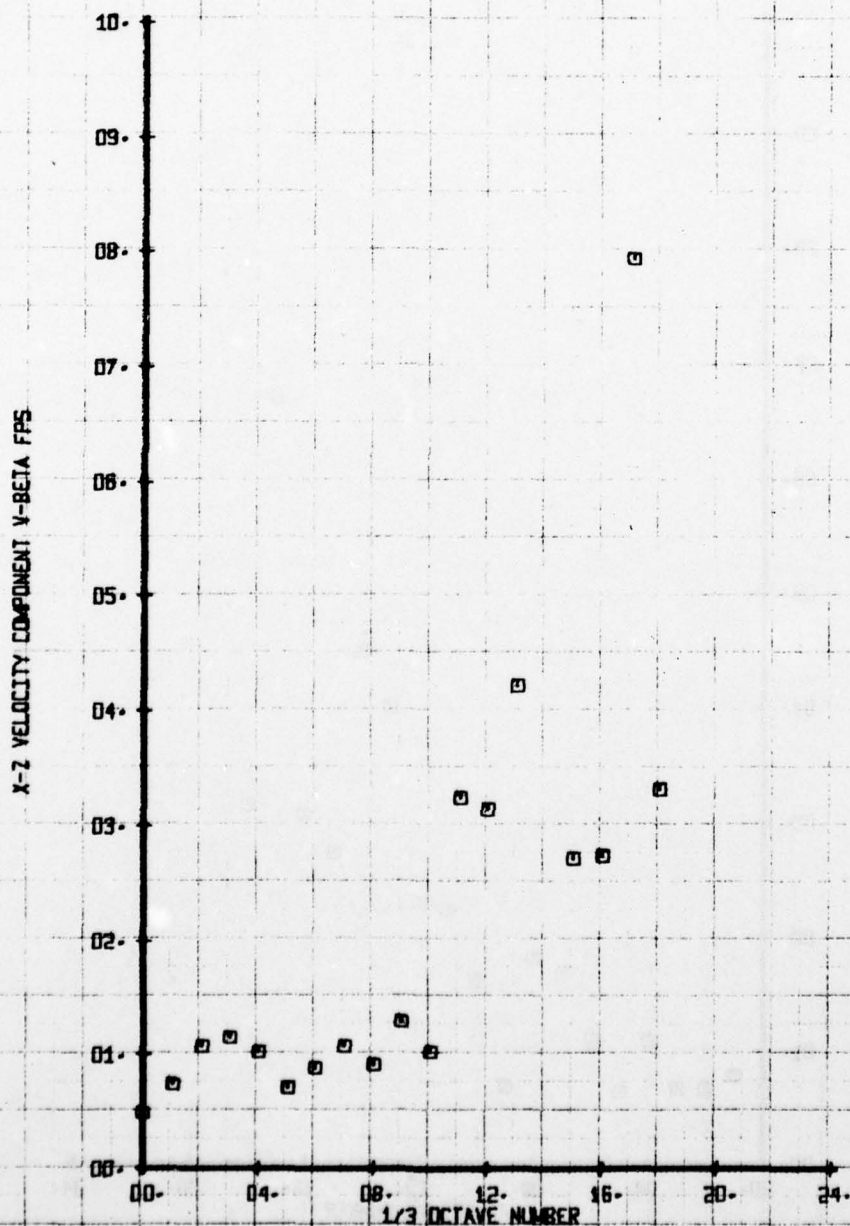
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7-6D, 1.25G 150PSI BASIC E1
 RUN 197 TP 4

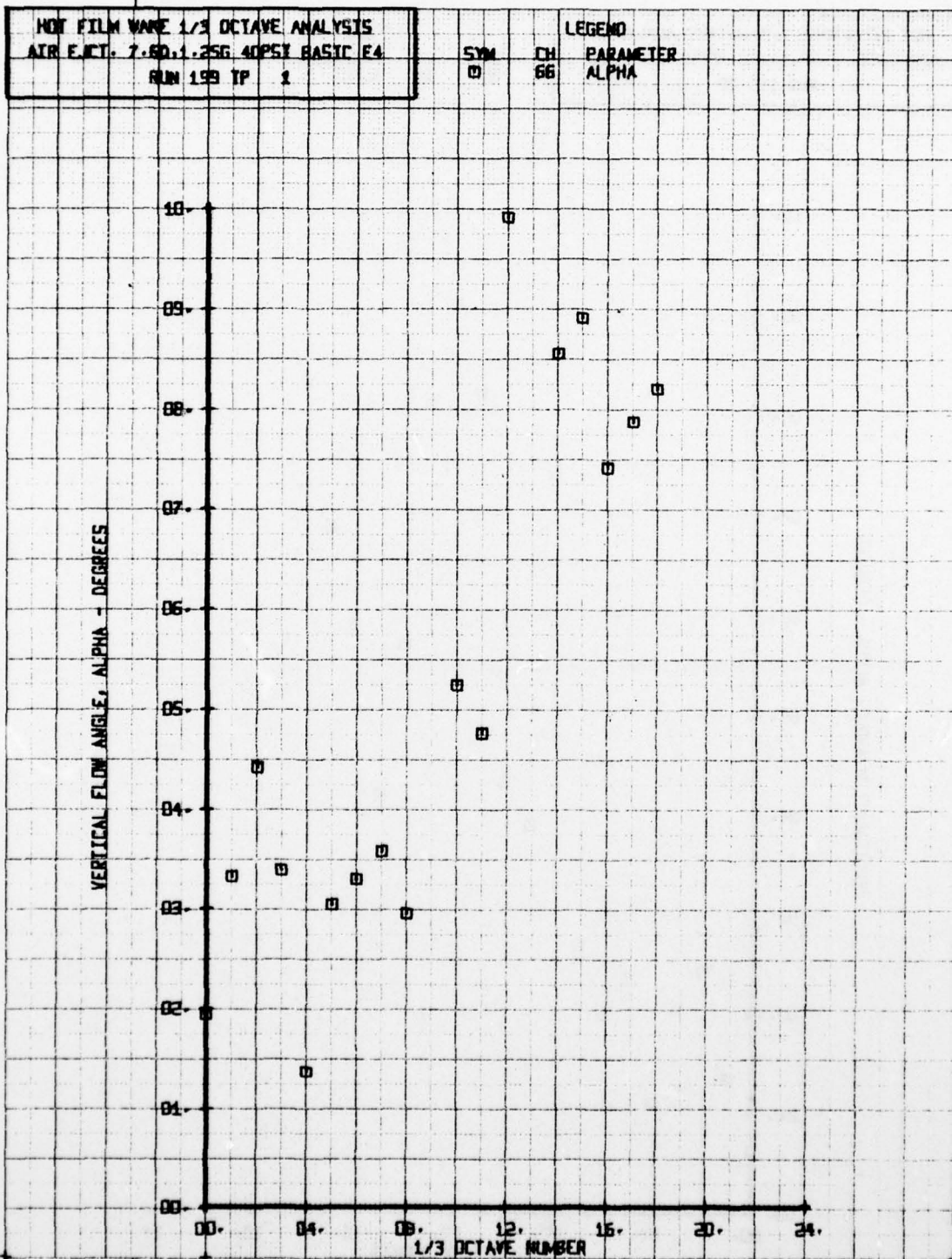
LEGEND
 SYM CH PARAMETER
 □ 65 V-BETA



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECT- 7.60, 1.25G 150PSI BASIC E1
 RUN 197 TP 5

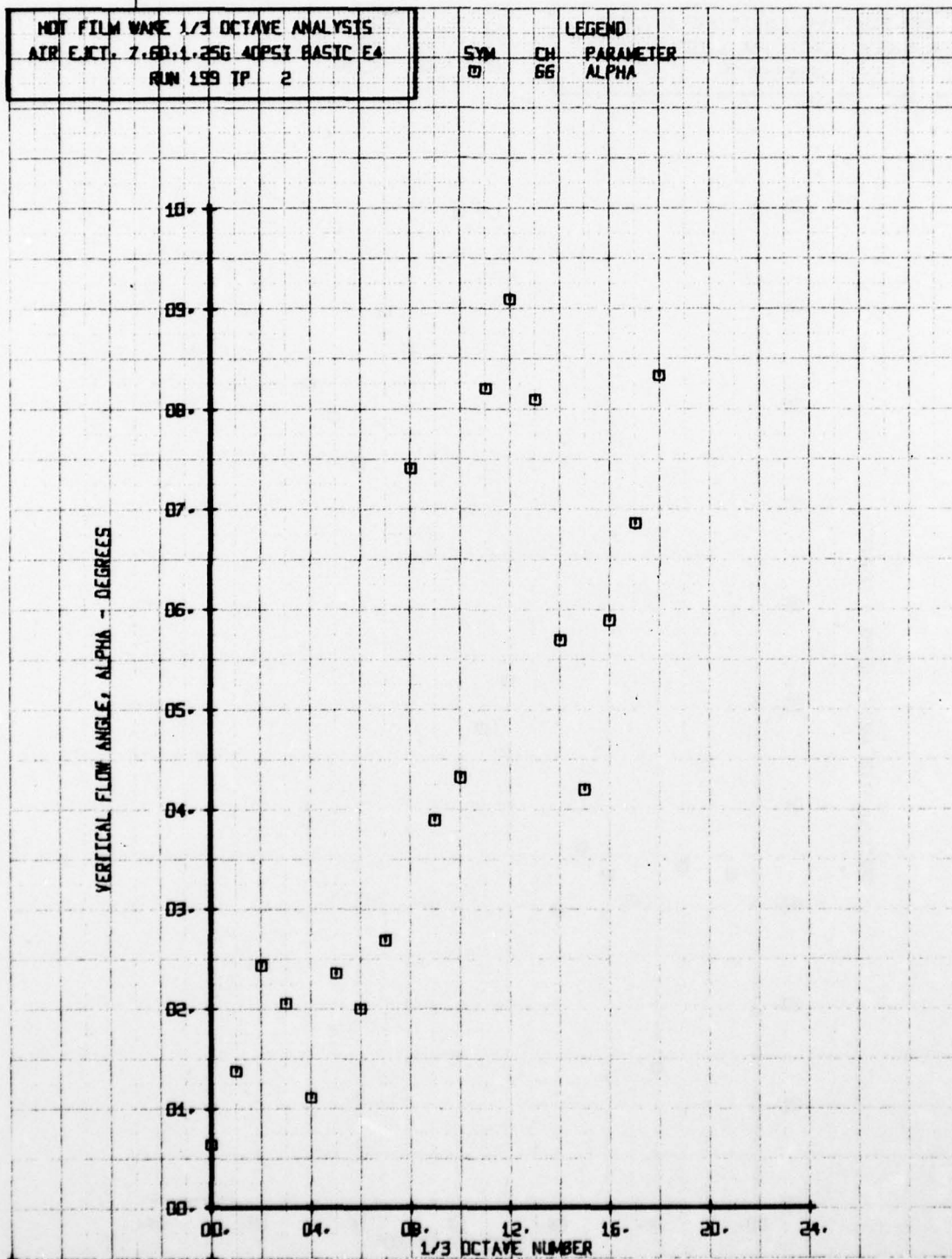
LEGEND
 SYM CH PARAMETER
 □ 65 V-BETA





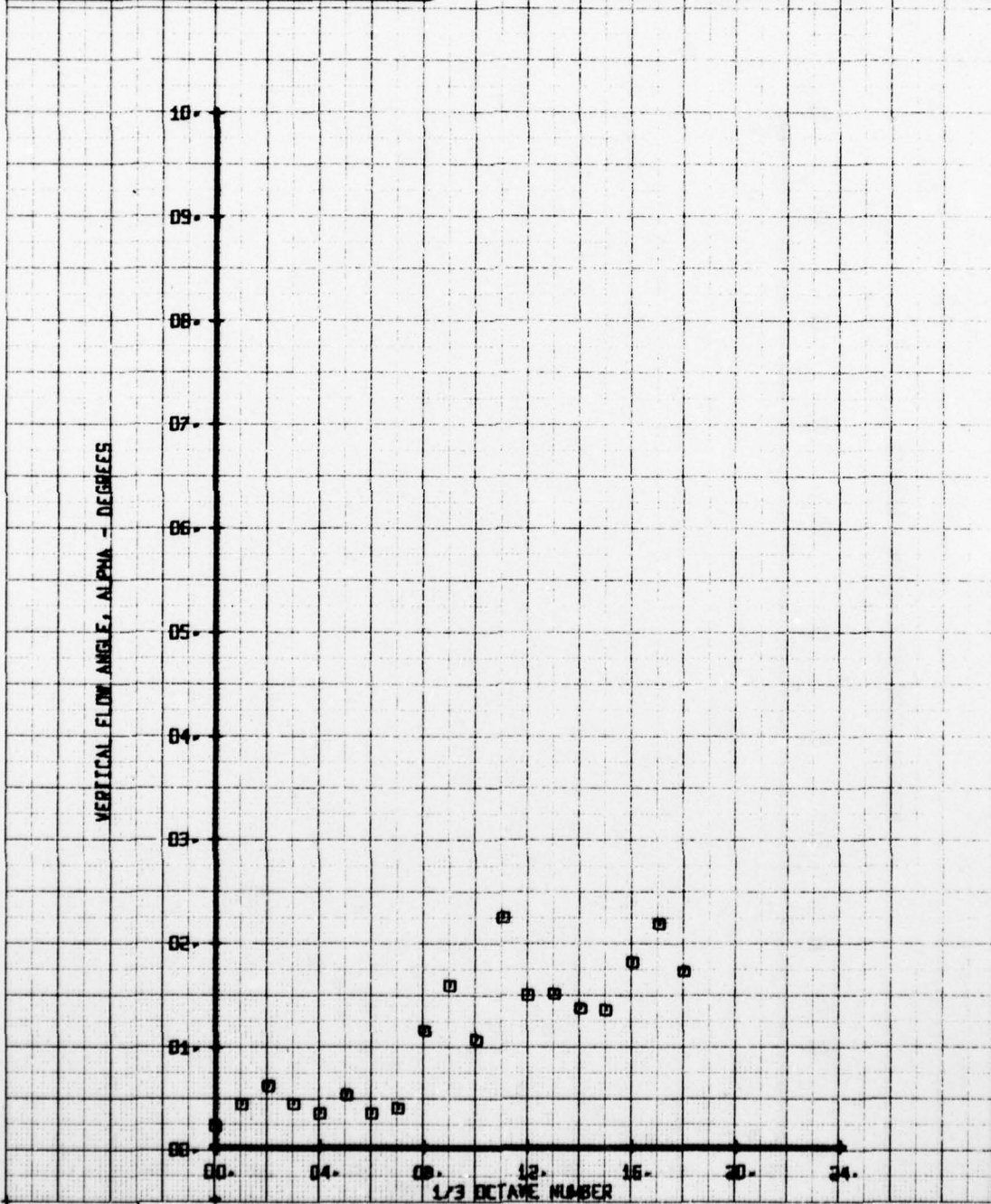
NOT FILM WARE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60, 1.25G 40PSI BASIC E4
 RUN 199 TP 2

SYM CH PARAMETER
 0 66 ALPHA



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60.1.25G 40PSI BASIC EA
 RUN 199 TP 3

SYM CH PARAMETER
 0 66 ALPHA



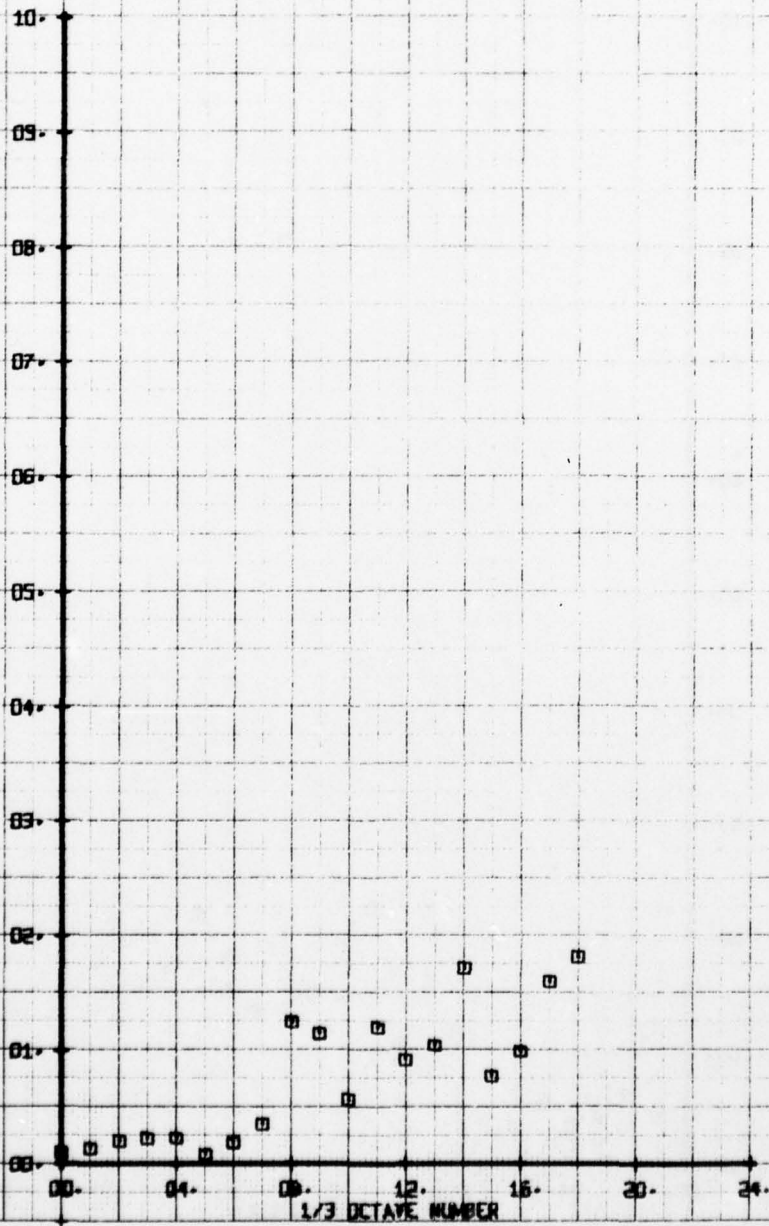
HOT FILM WARE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60, 1.25G 40PSI BASIC E4
 RUN 199 TP 4

SYM
 □

CH
 66

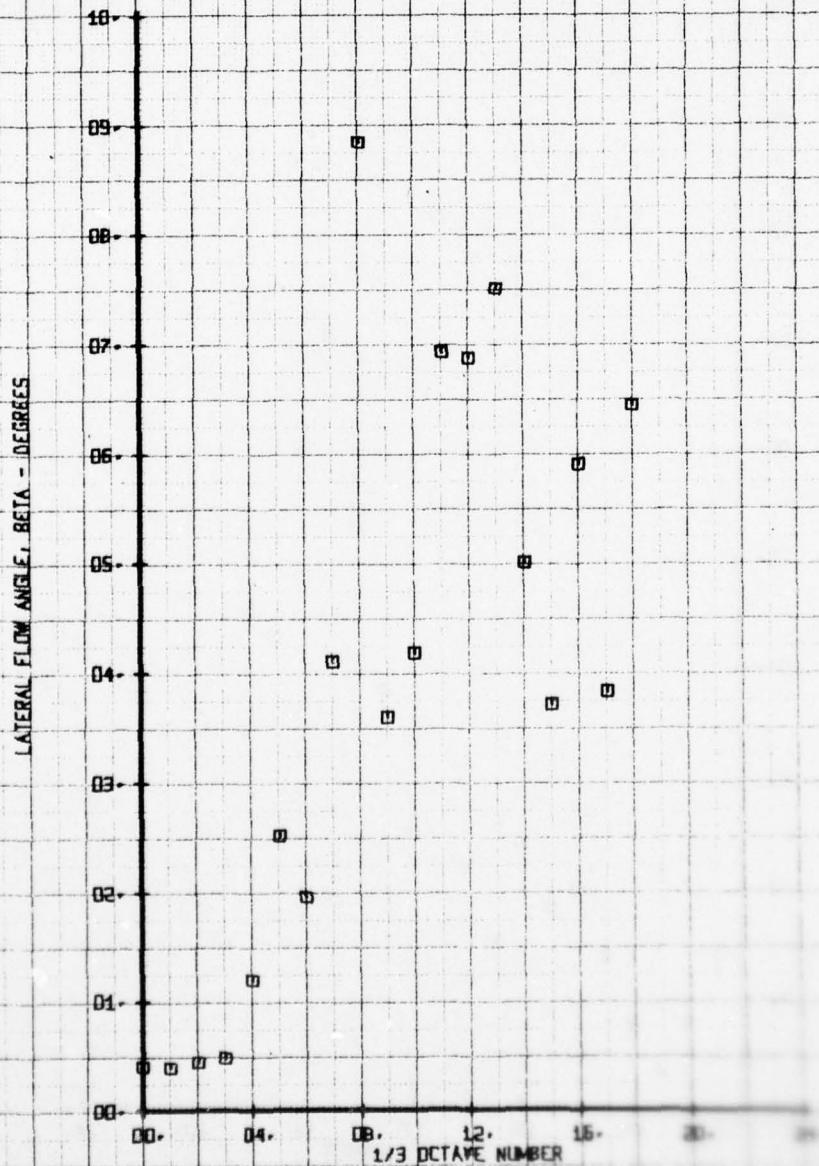
LEGEND
 PARAMETER
 ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES



HOT FILM WAVE 1/3 OCTAVE ANALYSIS
 AIR F.J.T. 7-60, 1-25G 40PSY BASIC E4
 RUN 199 TP 1

LEGEND
 CH 65
 PARAMETER
 BETA



AD-A063 244

BOEING VERTOL CO PHILADELPHIA PA

F/G 1/3

INTERACTIONAL AERODYNAMICS OF THE SINGLE ROTOR HELICOPTER CONF--ETC(U)

SEP 78 P F SHERIDAN

DAAJ02-77-C-0020

UNCLASSIFIED

USARTL-TR-78-23D

NL

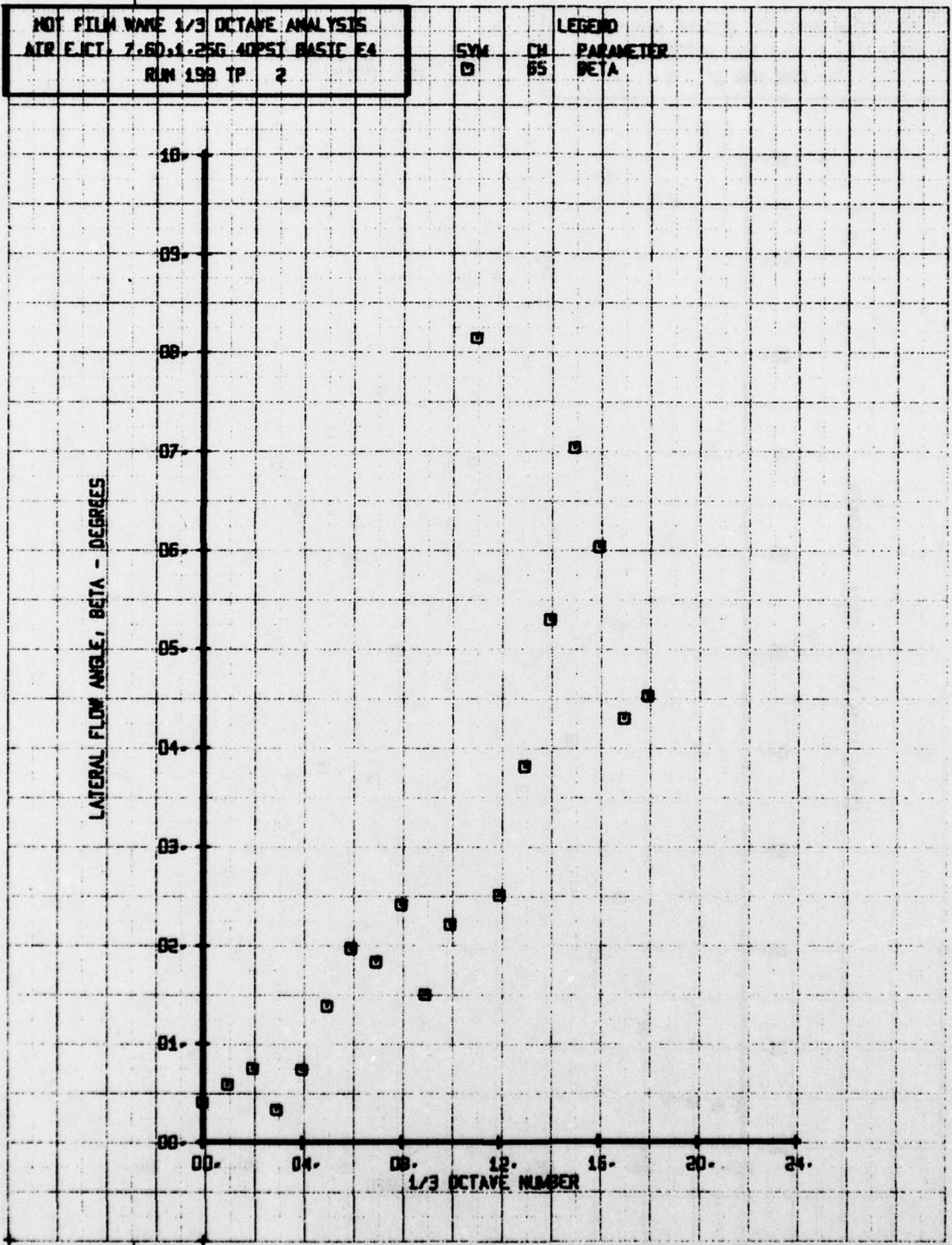
2 OF 3

AD-A063244



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR FLOW: 7.60, 1.25G 40PST BASIC EA
 RUN 198 TP 2

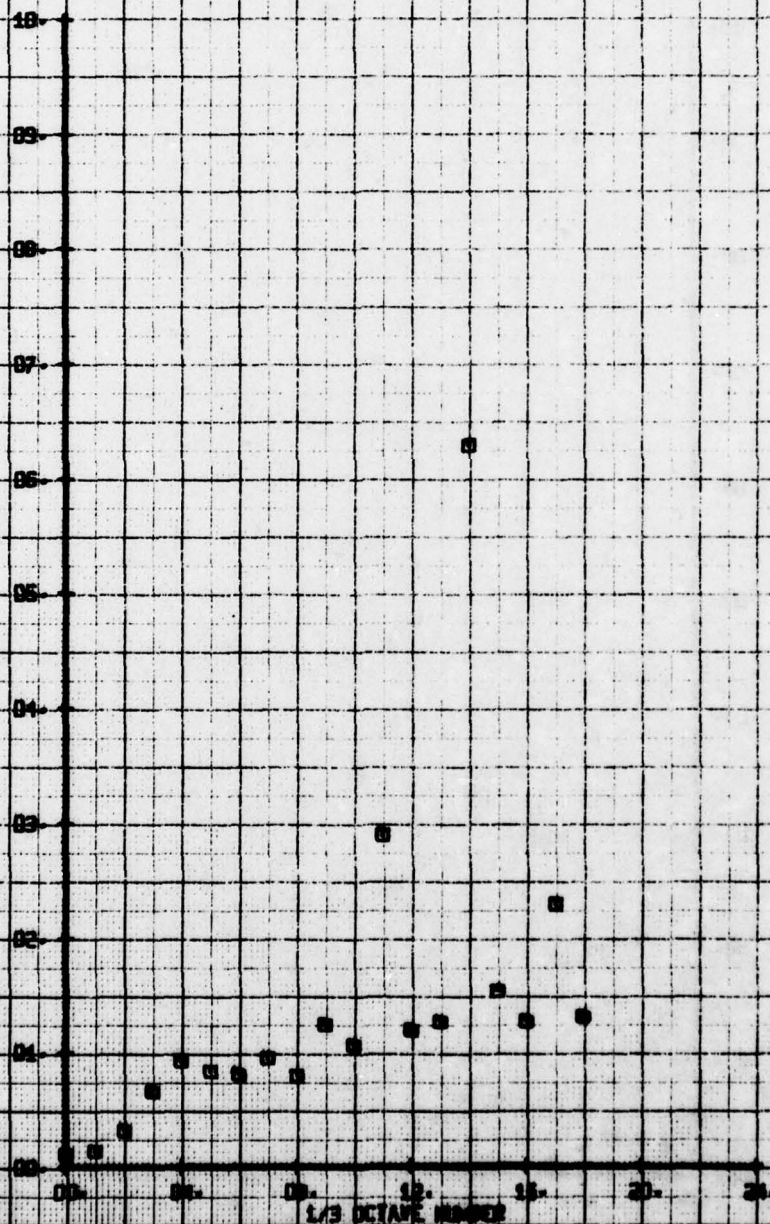
SYM CH
 0 55
 LEGEND
 PARAMETER
 BETA



NOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR FLOW: 7.60, 1.25G 40PSI BASIC E4
 RUN 193 TP 3

SYM CH PARAMETER
 □ 65 BETA

LATERAL FLOW ANGLE, BETA - DEGREES



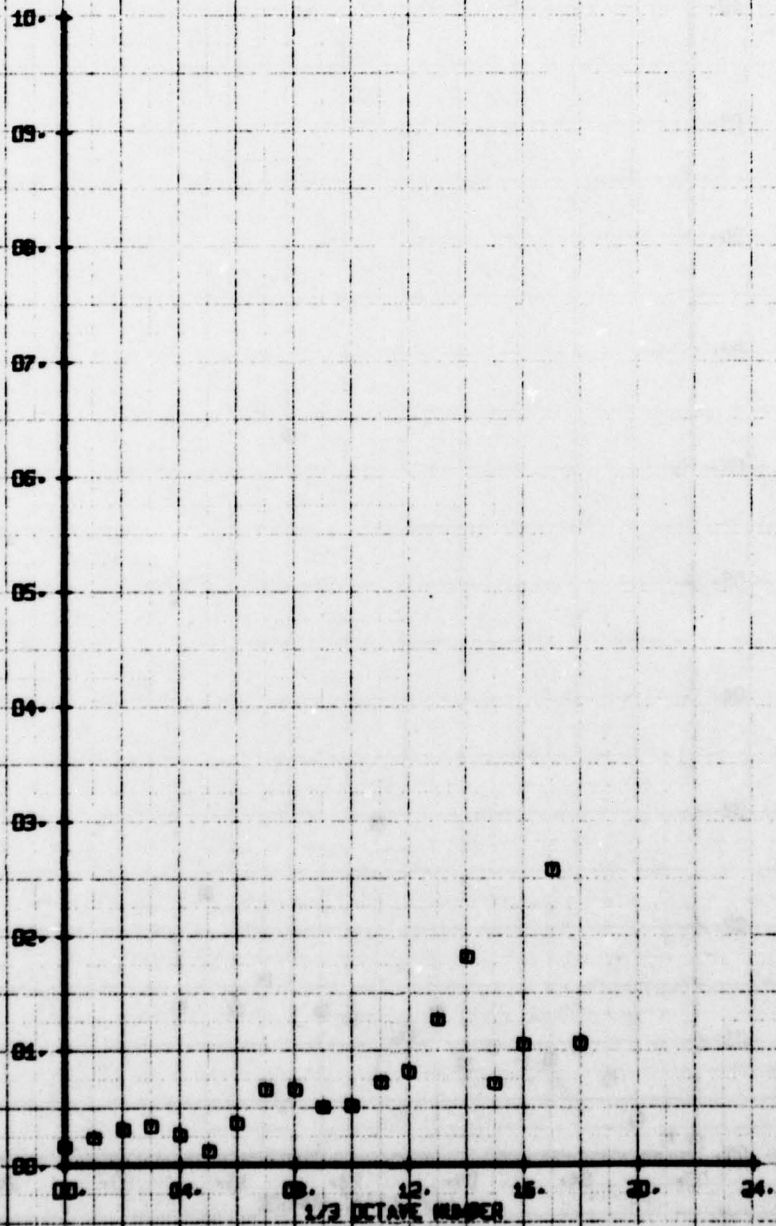
HOT FILM WAVE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60:1.25G 40PSI BASIC EA
 RUN 199 TP 4

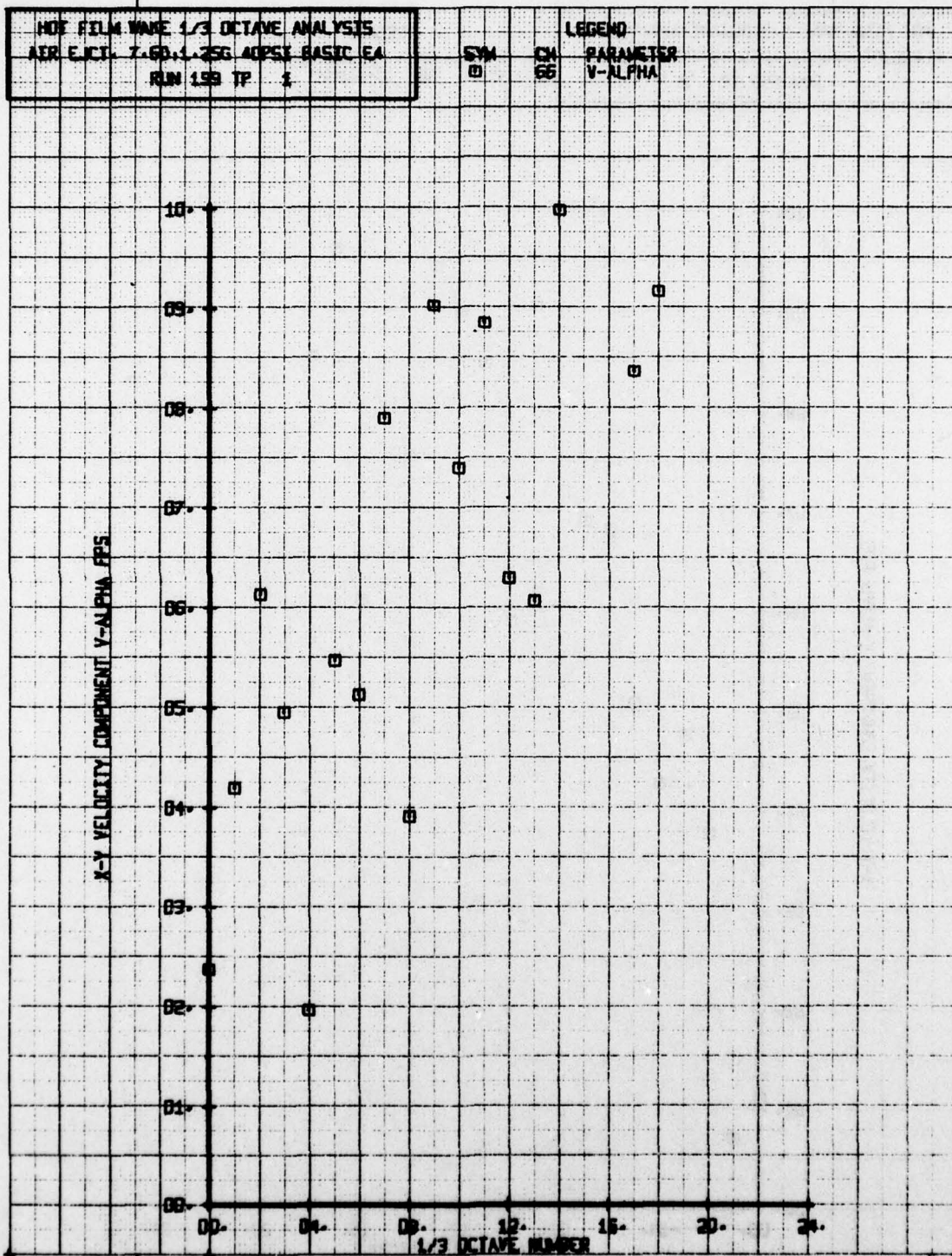
SYM
 0

CH
 65

LEGEND
 PARAMETER
 BETA

LATERAL FLOW ANGLE, BETA - DEGREES





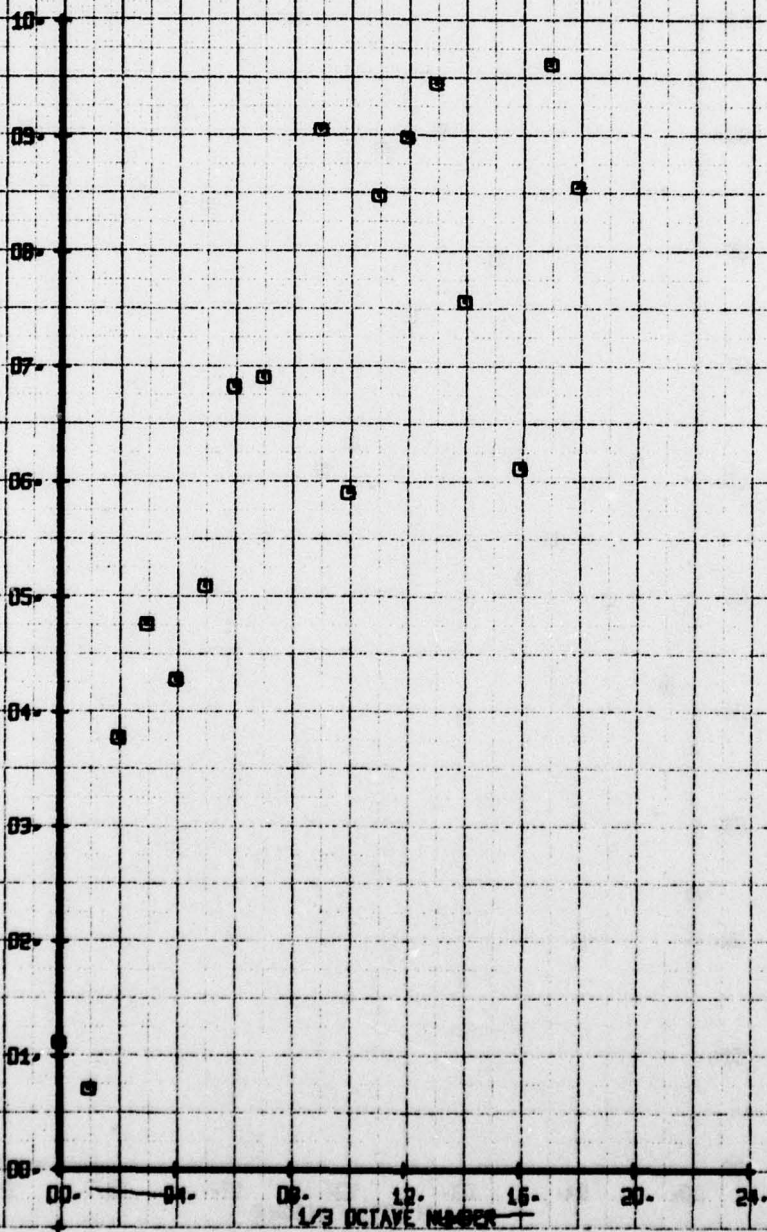
NOT FILM WARE 1/3 OCTAVE ANALYSIS
 AIR E CT 1-50.1-25G ADPST BASIC EA
 RUN 198 TP 2

SYM
 □

CH
 56

LEGEND
 PARAMETER
 V-ALPHA

X-Y VELOCITY COMPONENT V-ALPHA FPS



HOT FILM WARE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60 1.25G 40PSI BASIC EA
 RUN 198 TP 3

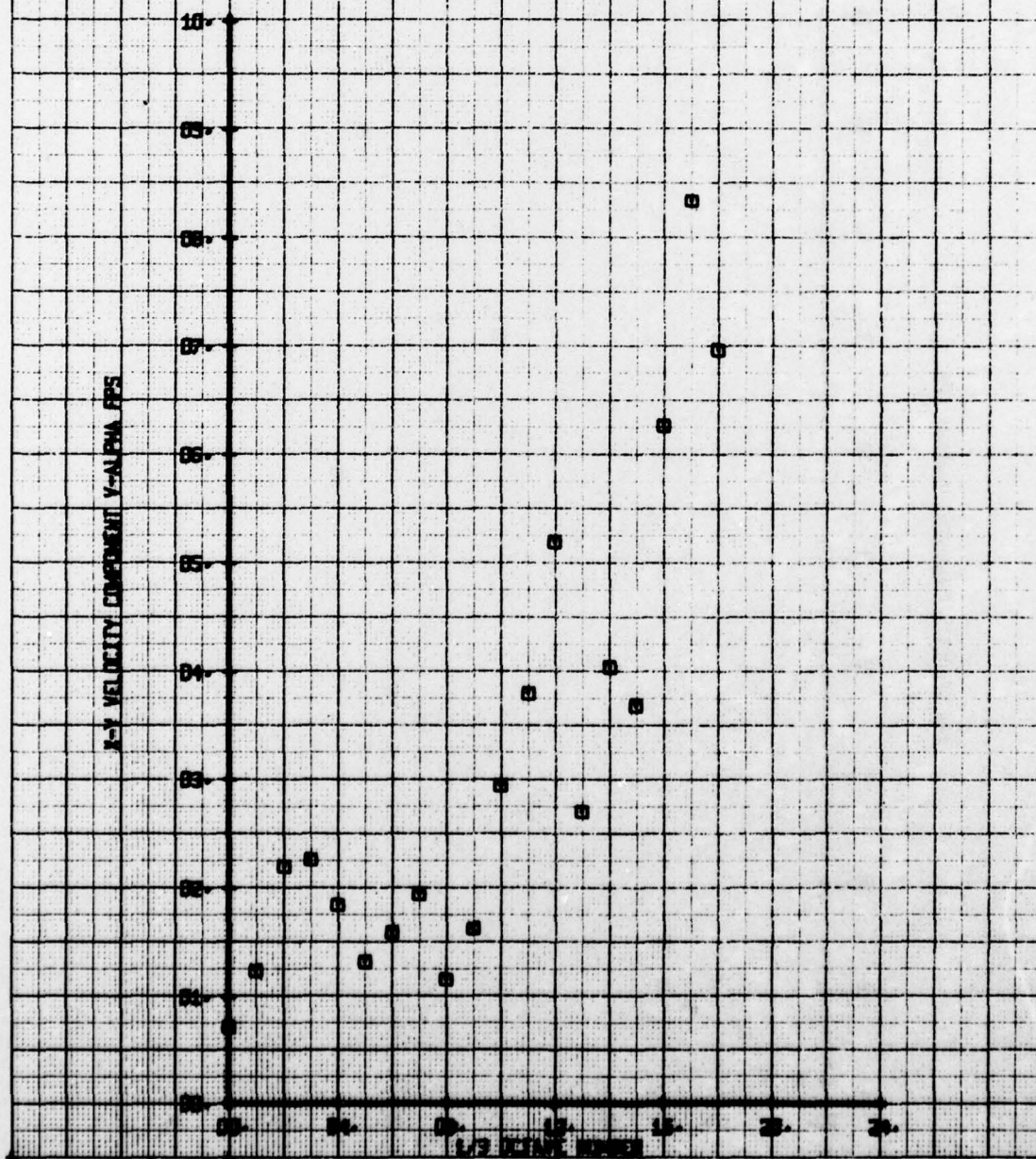
SYM
 0

LEGEND

CH
 66

PARAMETER
 V-ALPHA

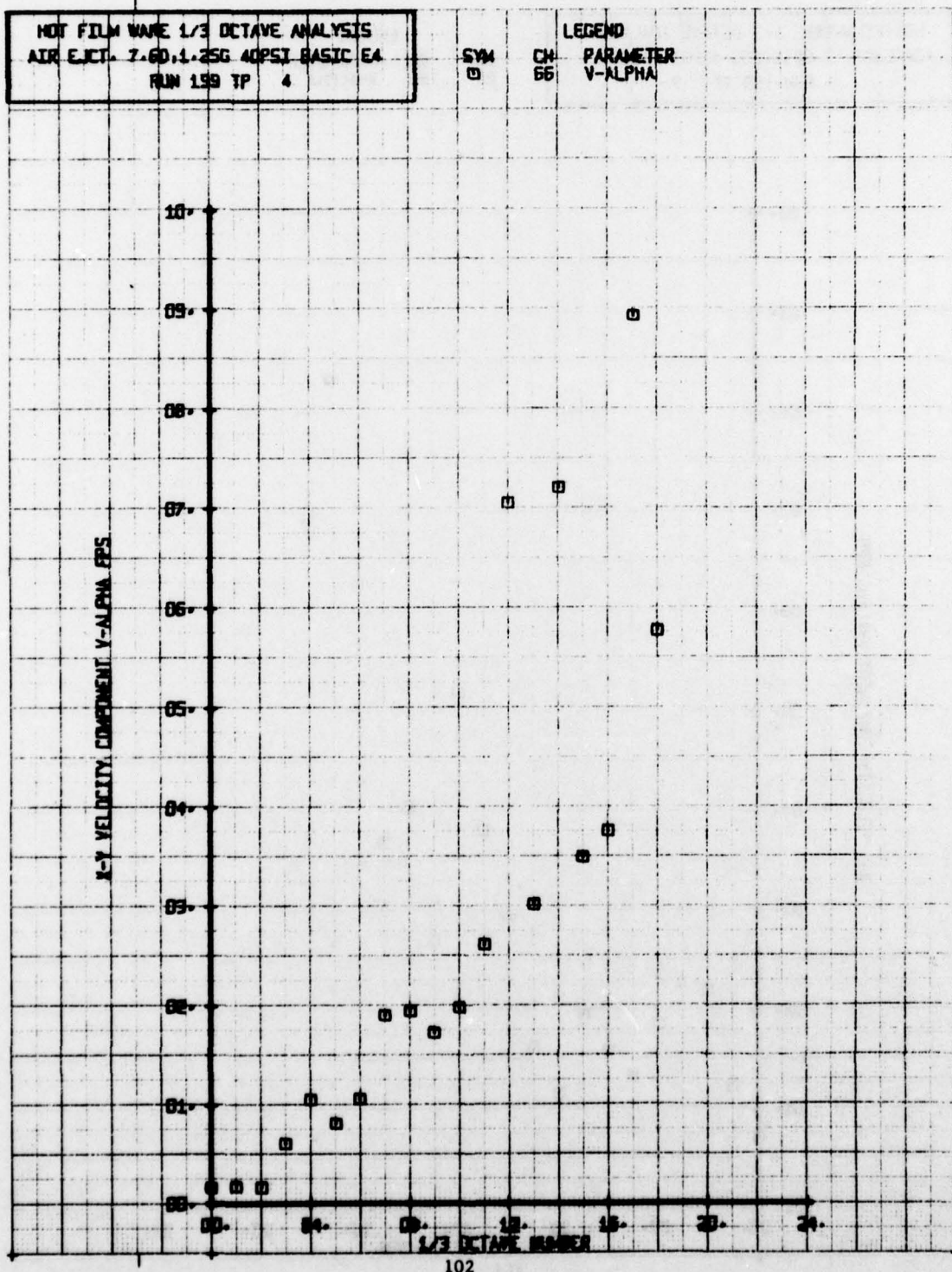
X-Y VELOCITY COMPONENT V-ALPHA FPS

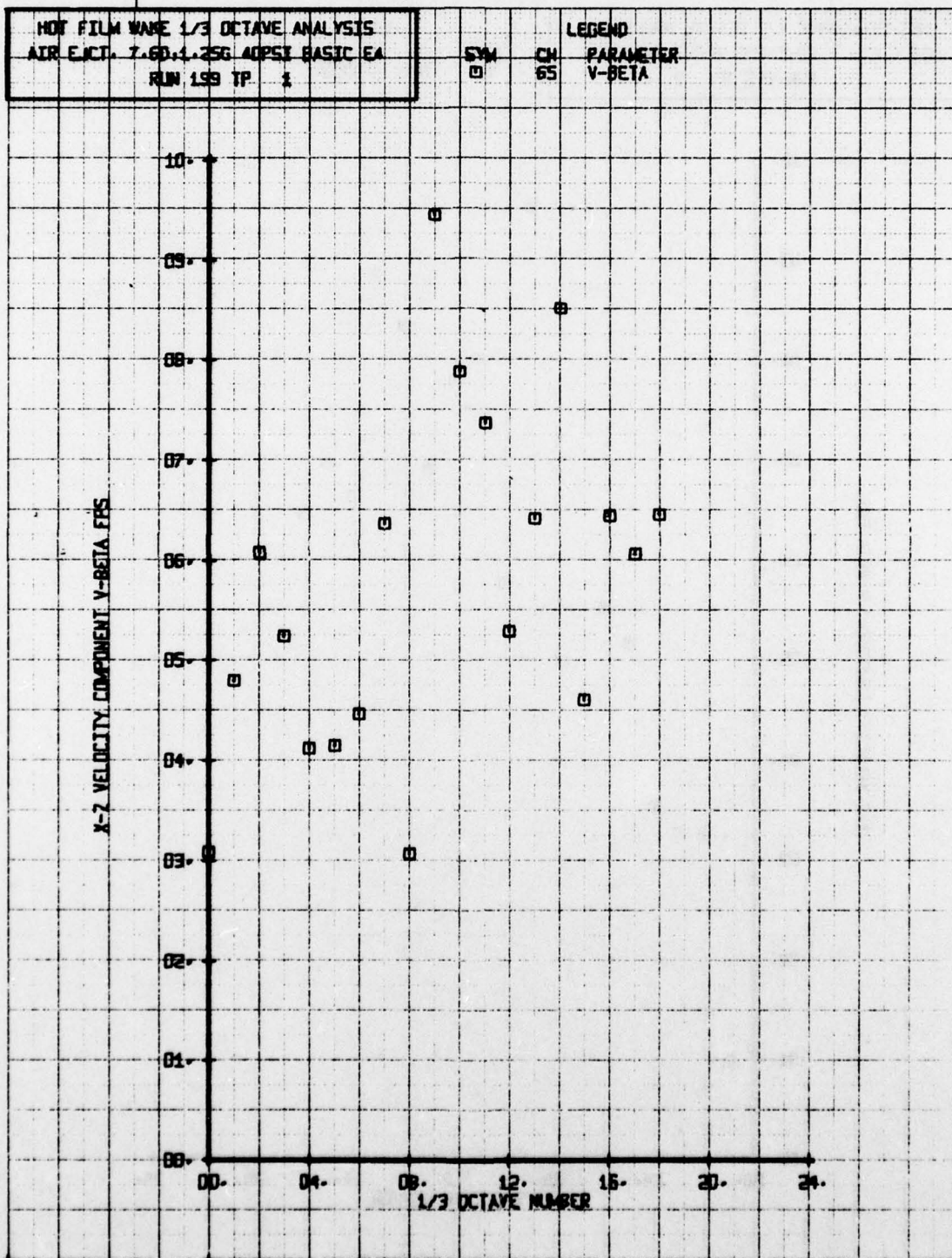


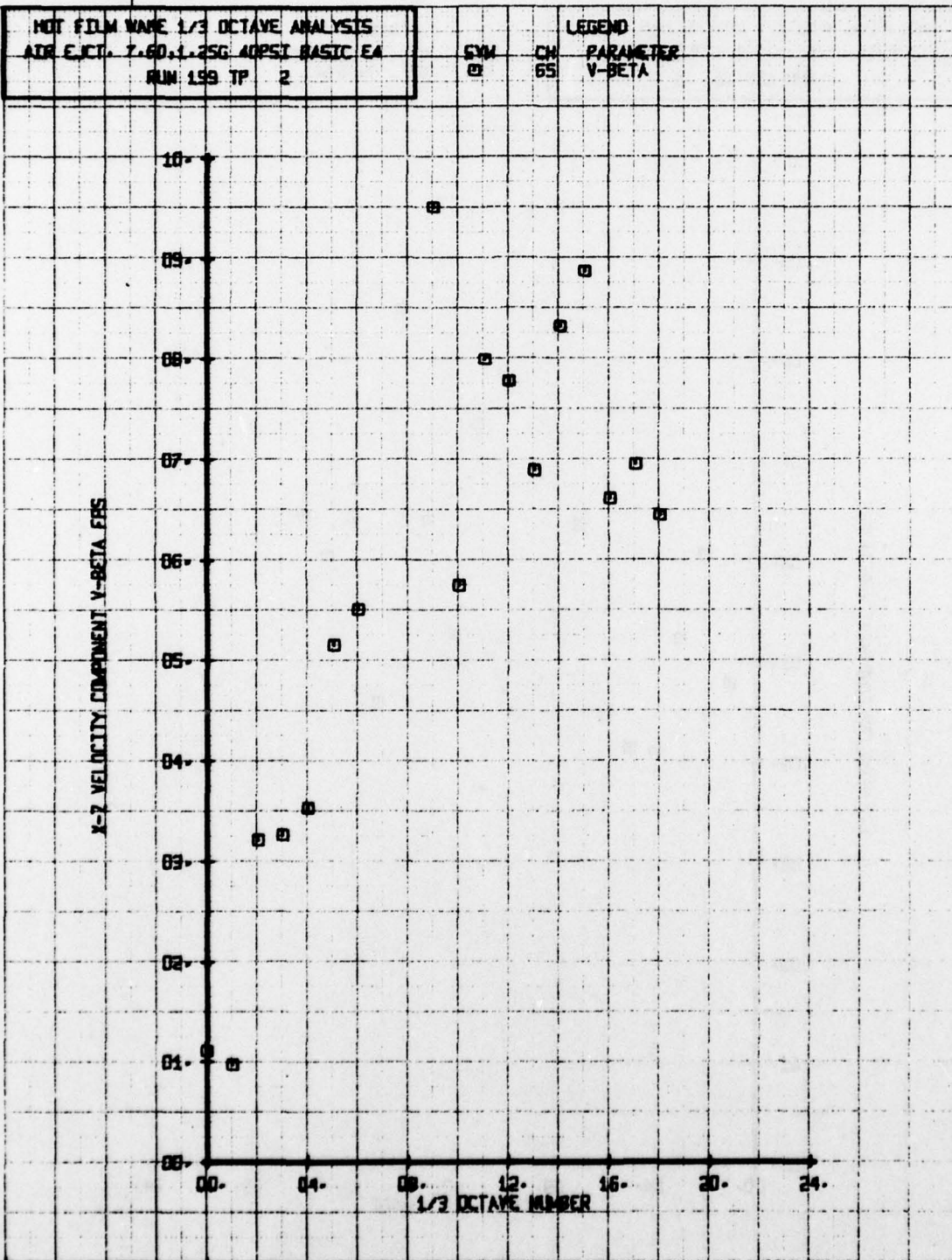
HOT FILM WAVE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60, 1.25G 40PSI BASIC EA
 RUN 199 TP 4

SYM
 □

LEGEND
 CH 66
 PARAMETER
 V-ALPHA







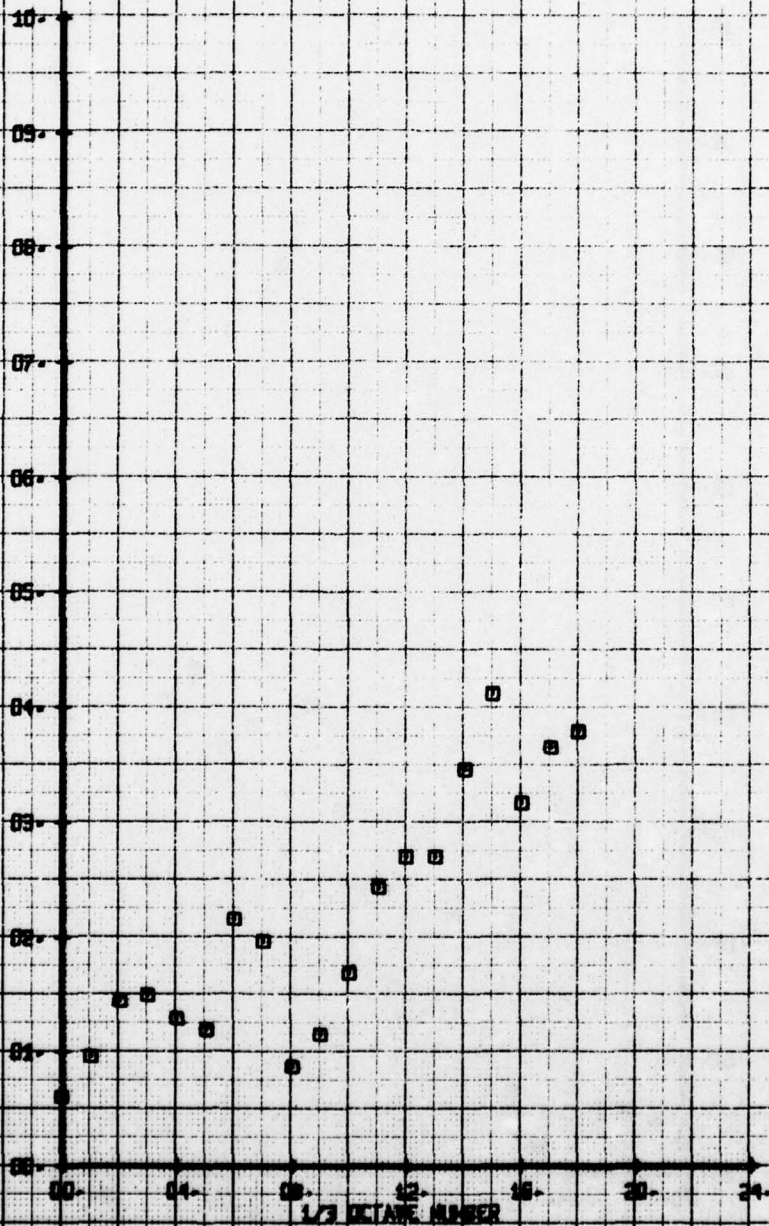
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7.60, 1.25G, 40PSI BASIC EA
 RUN 199 TP 3

GMM
 0

CH
 65

LEGEND
 PARAMETER
 V-BETA

X-Z VELOCITY COMPONENT V-BETA FPS



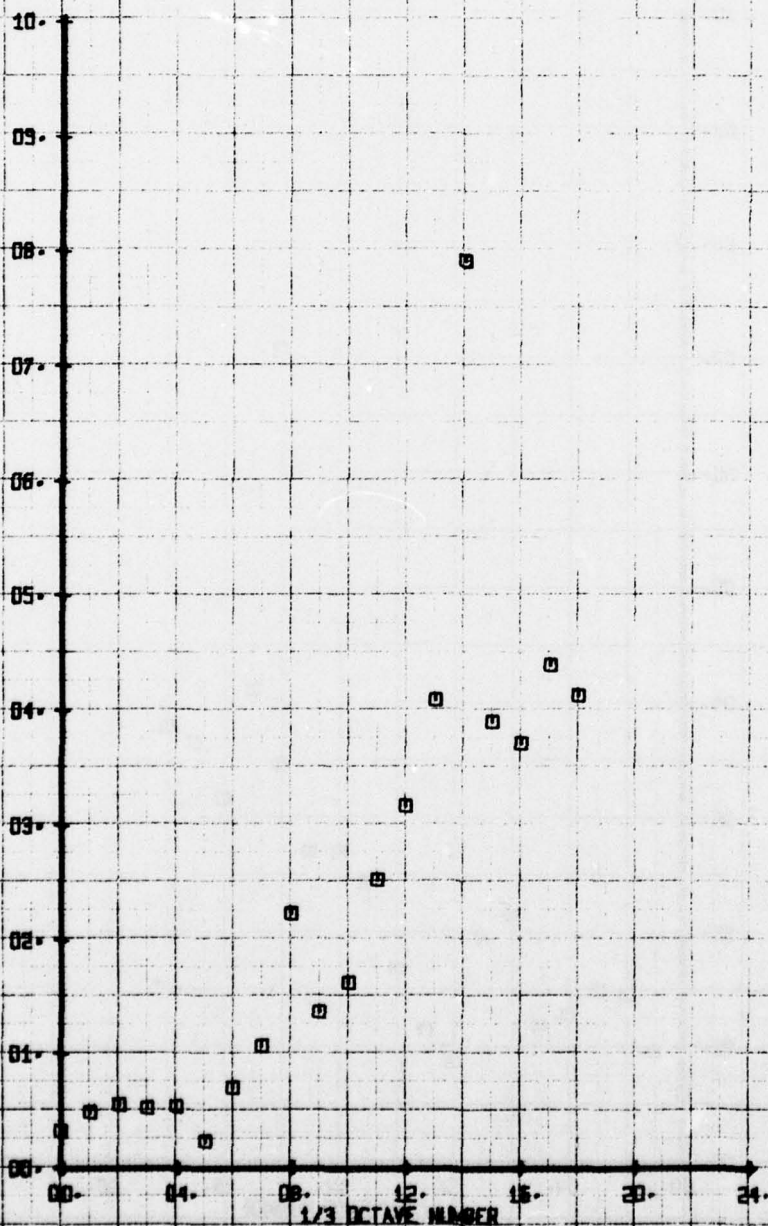
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECT. 7-60+1-25G 40PSI BASIC E4
 RUN 199 TP 4

SYM
 □

CH
 65

LEGEND
 PARAMETER
 V-BETA

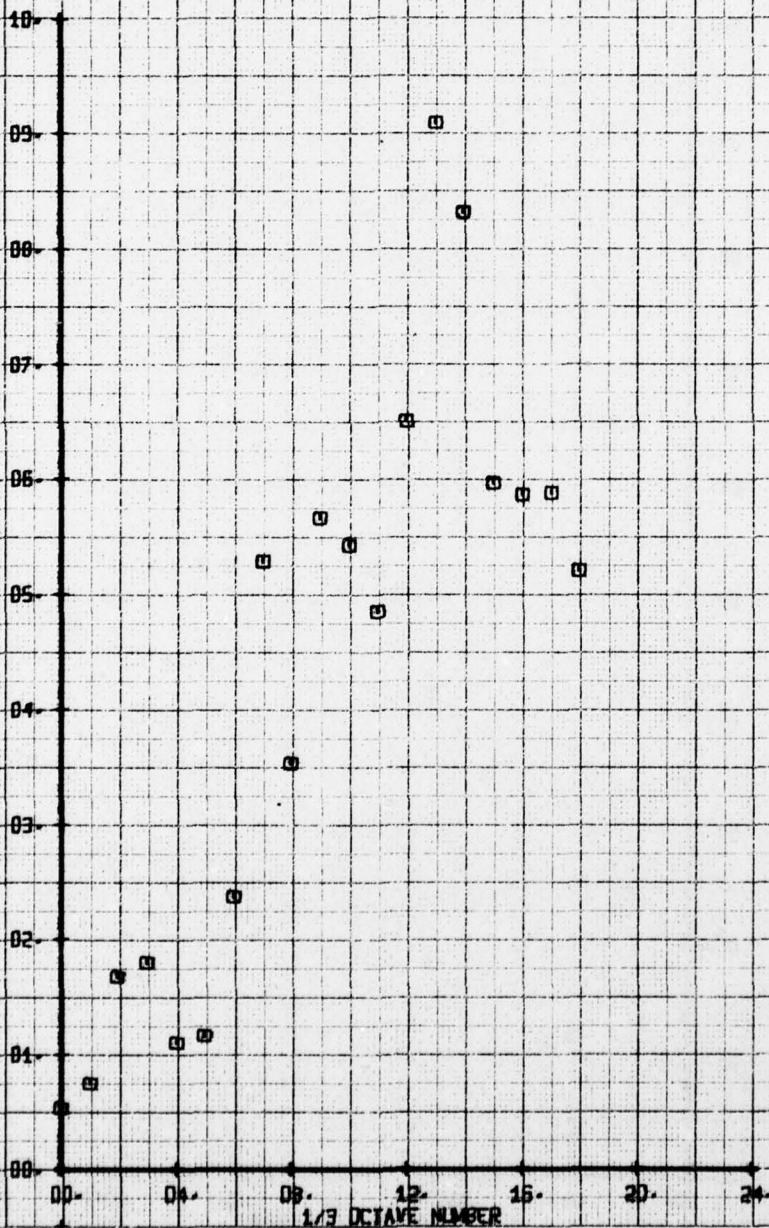
X-Z VELOCITY COMPONENT V-BETA FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W LBDY 7.60, 1.256, E4 150PSY
 RUN 200 TP 1

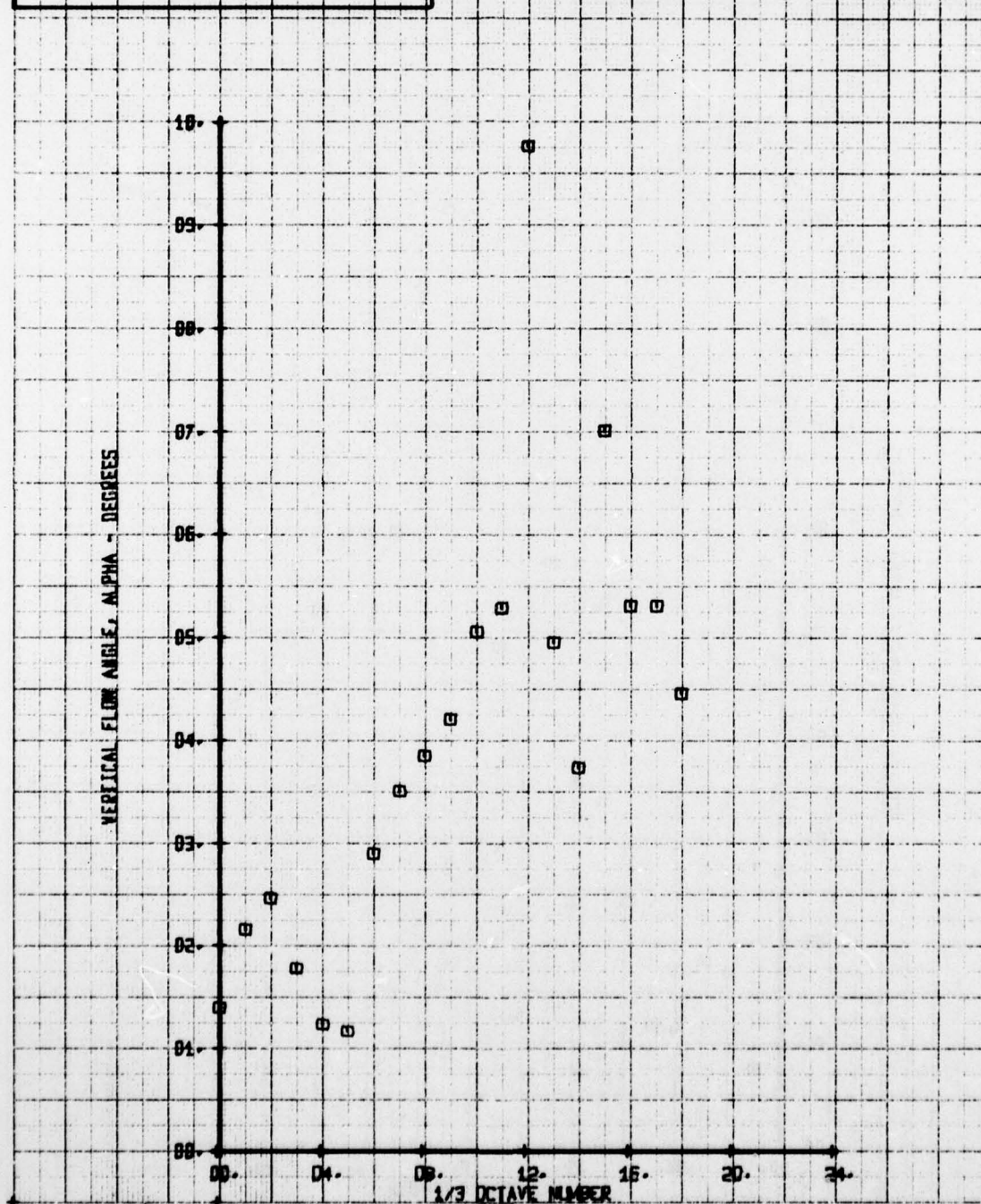
SYM	CH	PARAMETER
0	66	ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES



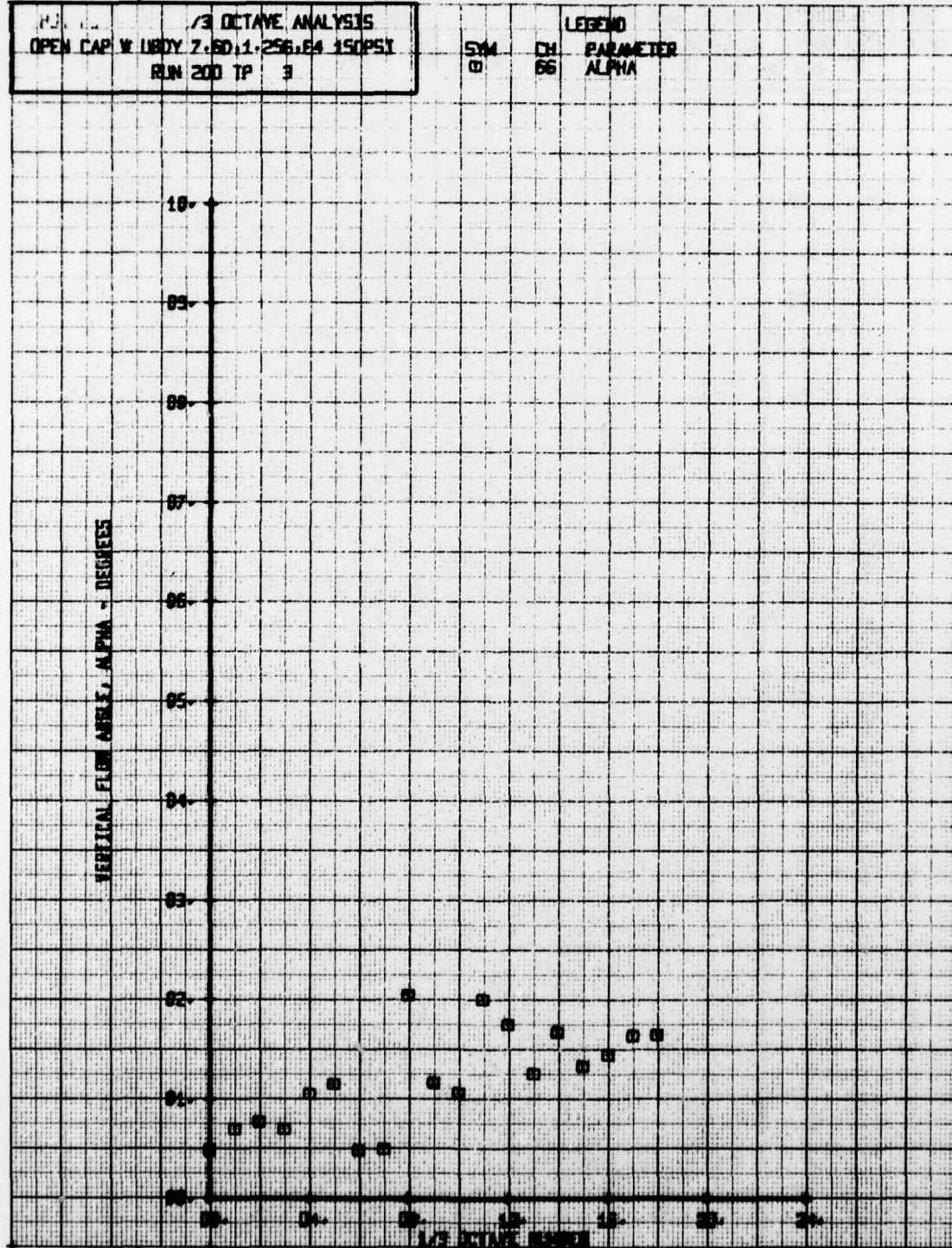
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W BODY 7.6D, 1.256, 64 150PSI
 RUN 200 TP 2

SUM CH
 0 66
 LEGEND
 PARAMETER
 ALPHA



/3 OCTAVE ANALYSIS
 OPEN CAP W BODY 7.6D1.256.E4 150PSI
 RUN 200 TP 3

SYM CH PARAMETER
 0 66 ALPHA



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W BODY 7.60, 1.256, E4 150PSI
 RUN 200 TP 4

SYM
 0

CH
 66

LEGEND
 PARAMETER
 ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES

10
 09
 08
 07
 06
 05
 04
 03
 02
 01
 00

1/3 OCTAVE NUMBER

HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W LBDY 7.60, 1.258, 84 150PSI
 RUN 200 TP 5

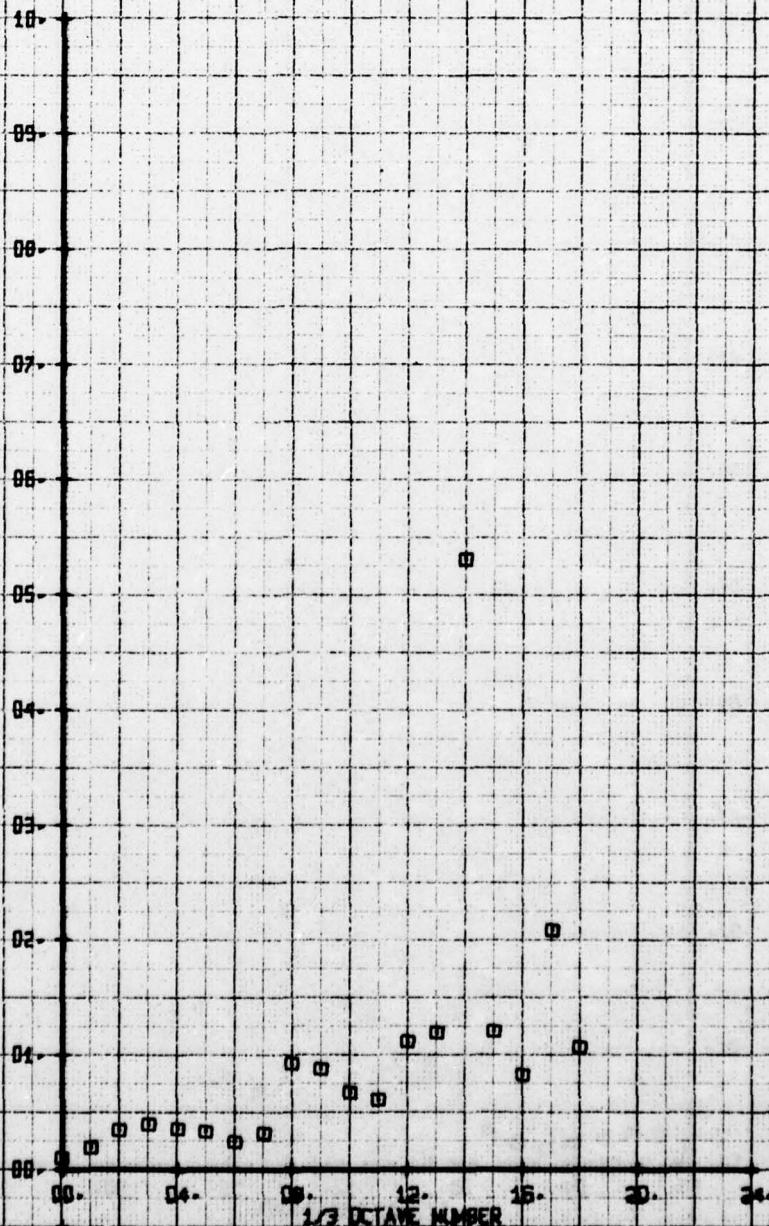
SYM
 0

CH
 66

LEGEND

PARAMETER
 ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES



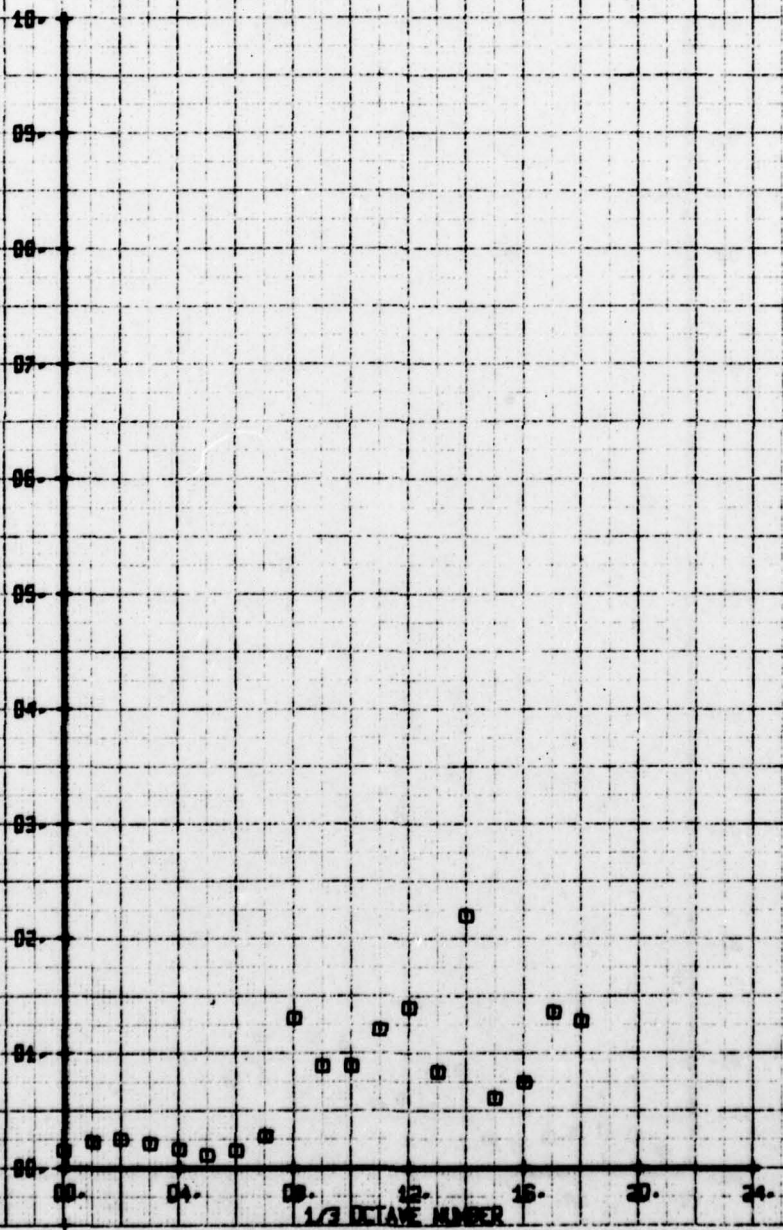
NOT FILM WARE 1/3 OCTAVE ANALYSIS
 OPEN CAP W UNDY 7-60, 1-256, 84 150PST
 RUN 200 TP 6

SW
 0

CH
 66

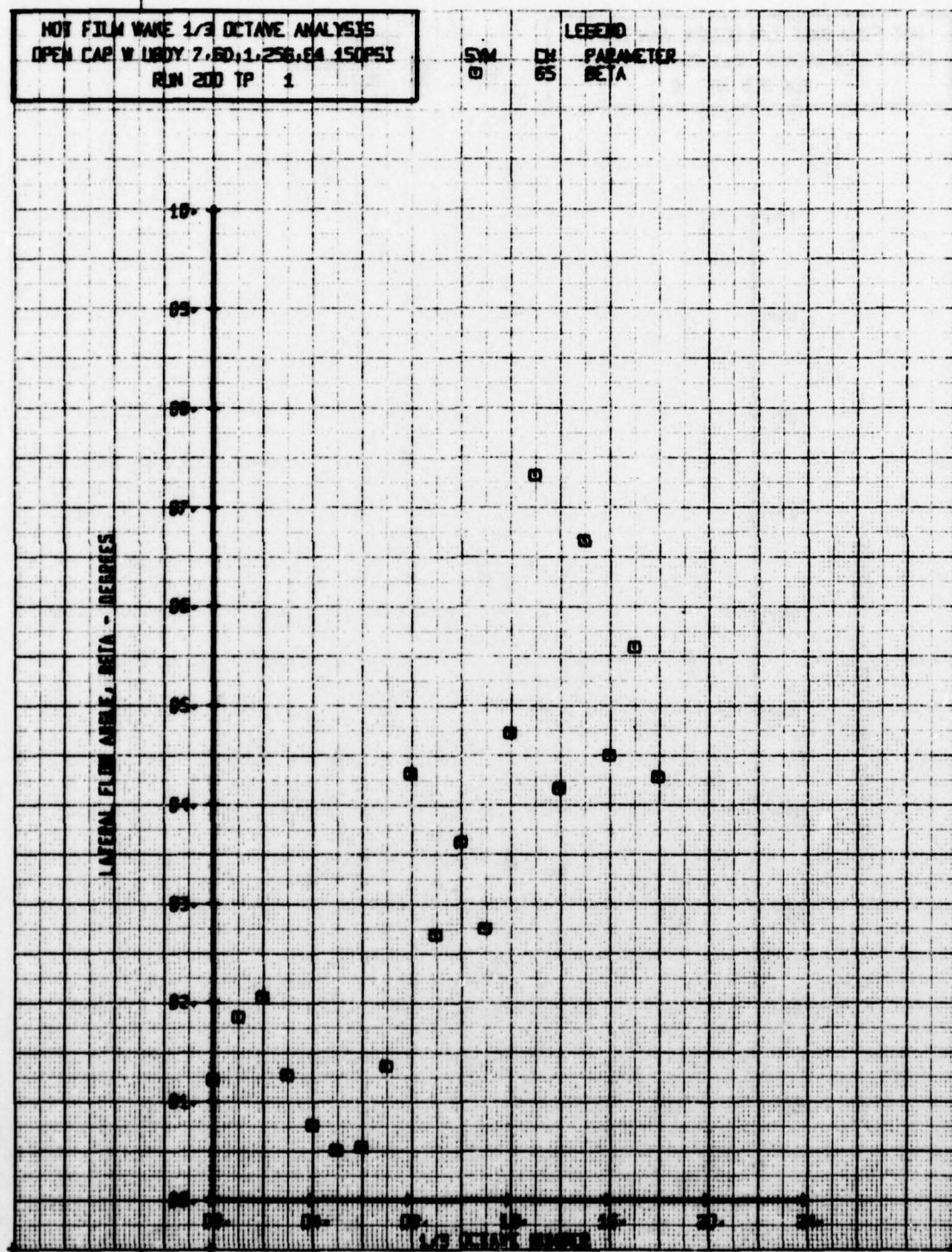
LEGEND
 PARAMETER
 ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W LBODY 7.60, 1.256, EA 150PSI
 RUN 200 TP 1

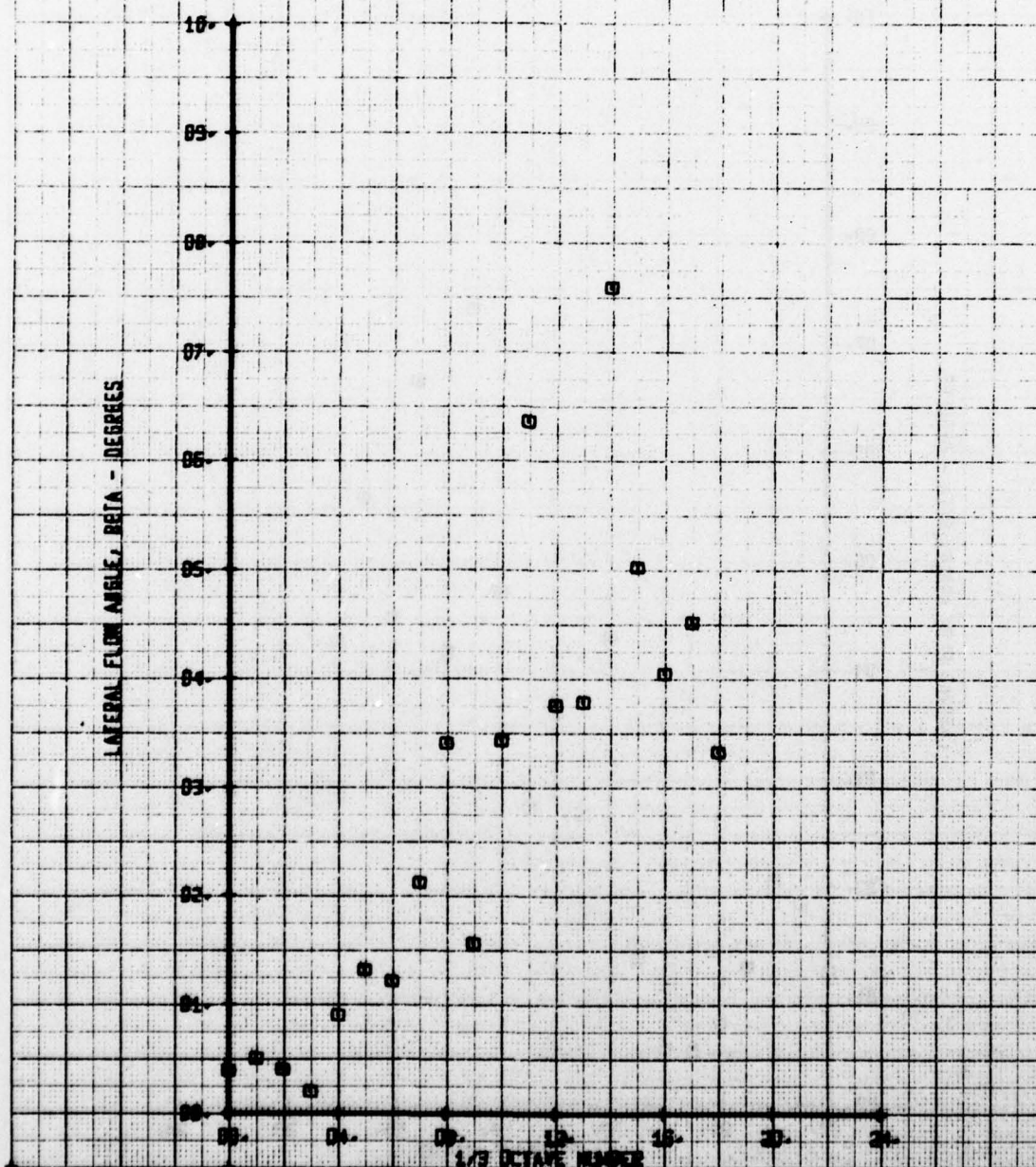
SYM	CH	PARAMETER
0	65	BETA



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W BODY 7.60:1.256.64 150PSI
 RUN 200 TP 2

SYM CH PARAMETER
 0 05 BETA

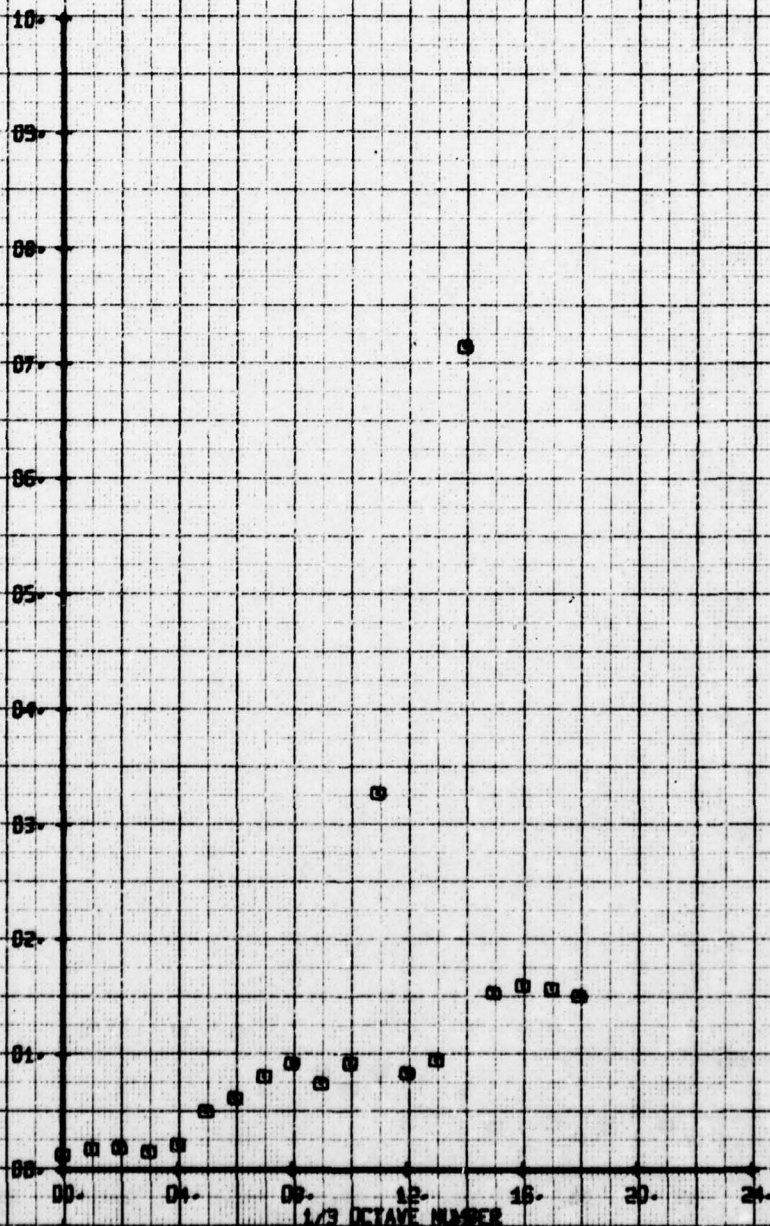
LATERAL FLOW ANGLE, BETA - DEGREES



NOI FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W LBDY 7.60.1.256.64 150PSI
 RUN 200 TP 3

SYN CH
 0 85
 LEGEND
 PARAMETER
 BETA

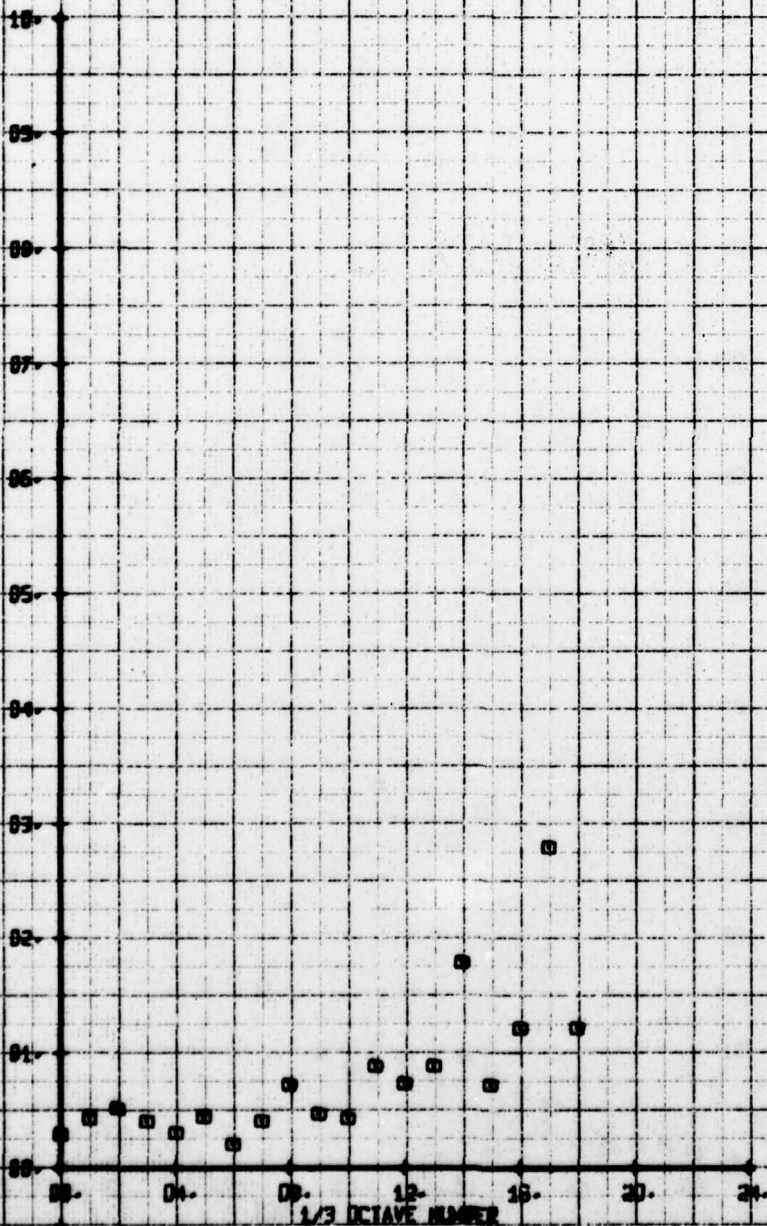
LATERAL FLOW ANGLE, BETA - DEGREES



NOT FILM WAVE 1/3 OCTAVE ANALYSIS
 OPEN CAP. W. BODY 7.50, 1.256, 0.4 150PSY
 RUN 200 TP 4

LEGEND	
SYM	PARAMETER
0	BETA

LATERAL FLOW ANGLE, BETA - DEGREES



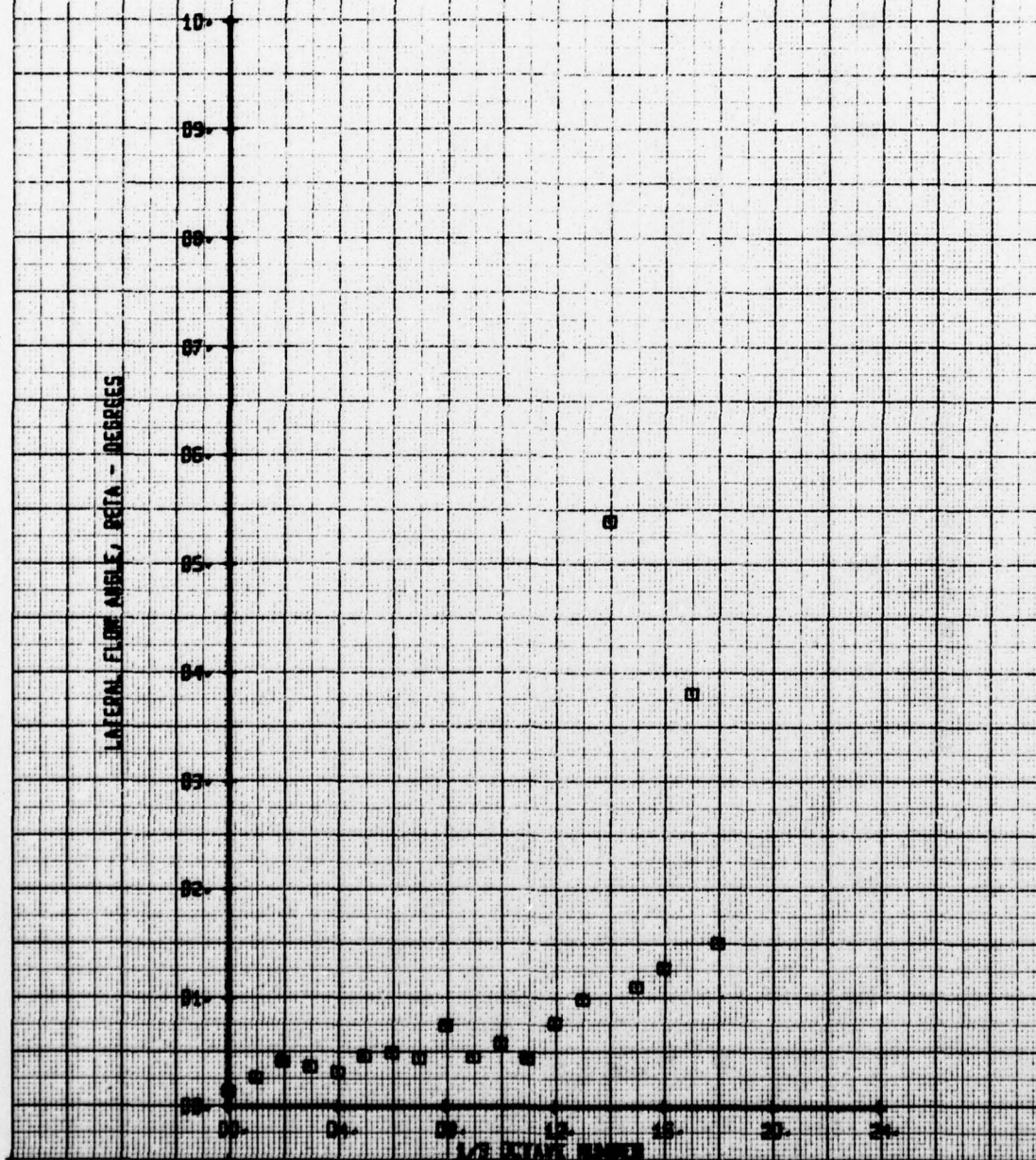
NOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W LBDY 7.50;1.256.E4 150PSI
 RUN 200 TP 5

SYM
 0

CH
 65

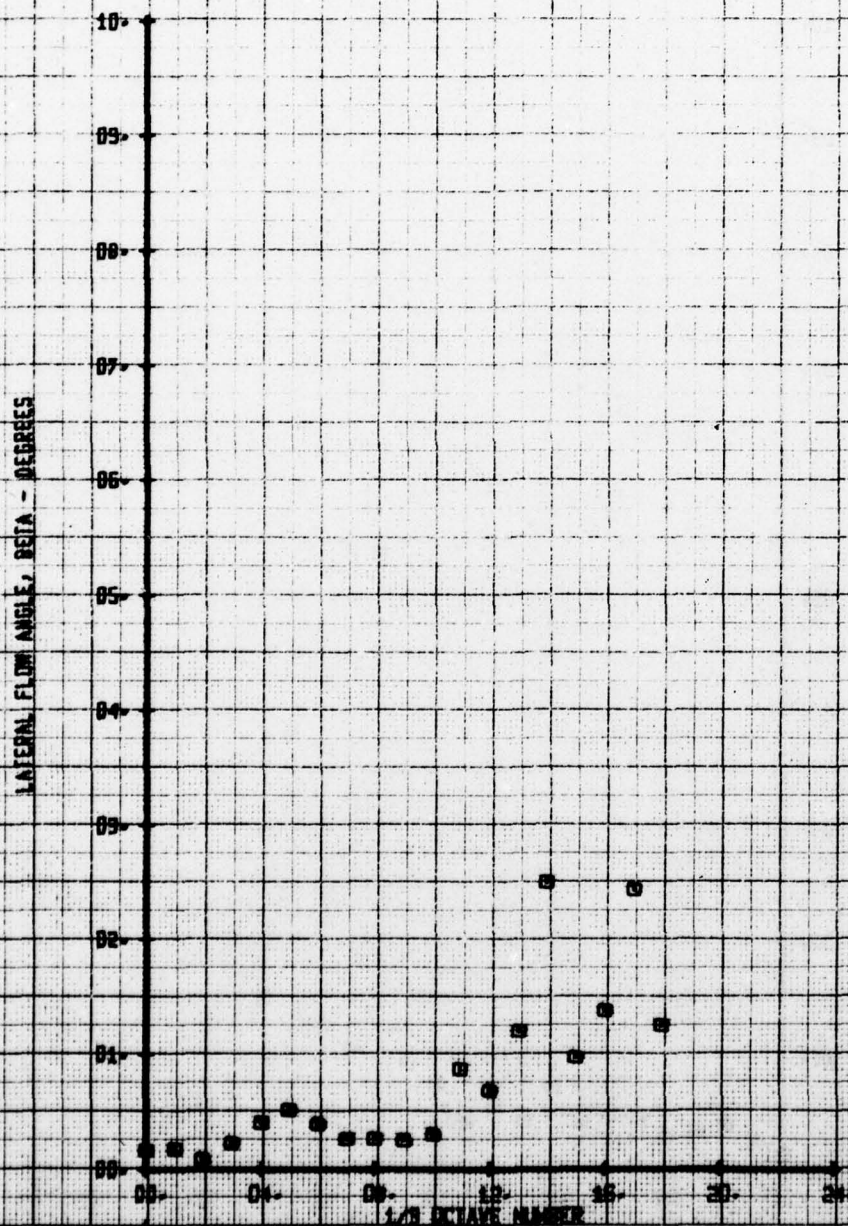
LEGEND
 PARAMETER
 BETA

LATERAL FLOW ANGLE, BETA - DEGREES



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W LB DY 7.60.1.256.E4 150PSI
 RUN 200 TP 6

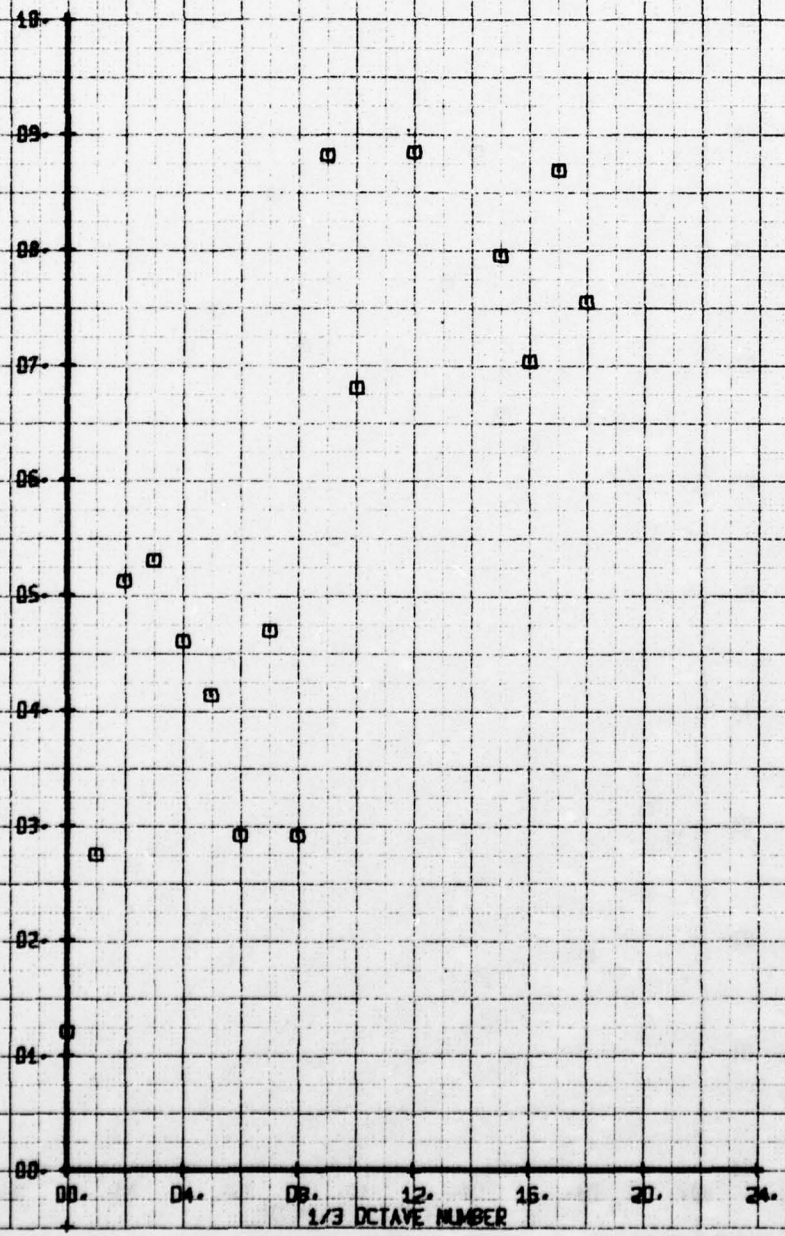
LEGEND	
SYM	CH
0	65
PARAMETER	
BETA	



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W UDDY 7.6D/1.256/E4 150PSI
 RUN 200 TP 1

SYM CH
 □ 66
 PARAMETER
 V-ALPHA

X-Y VELOCITY COMPONENT V-ALPHA FPS

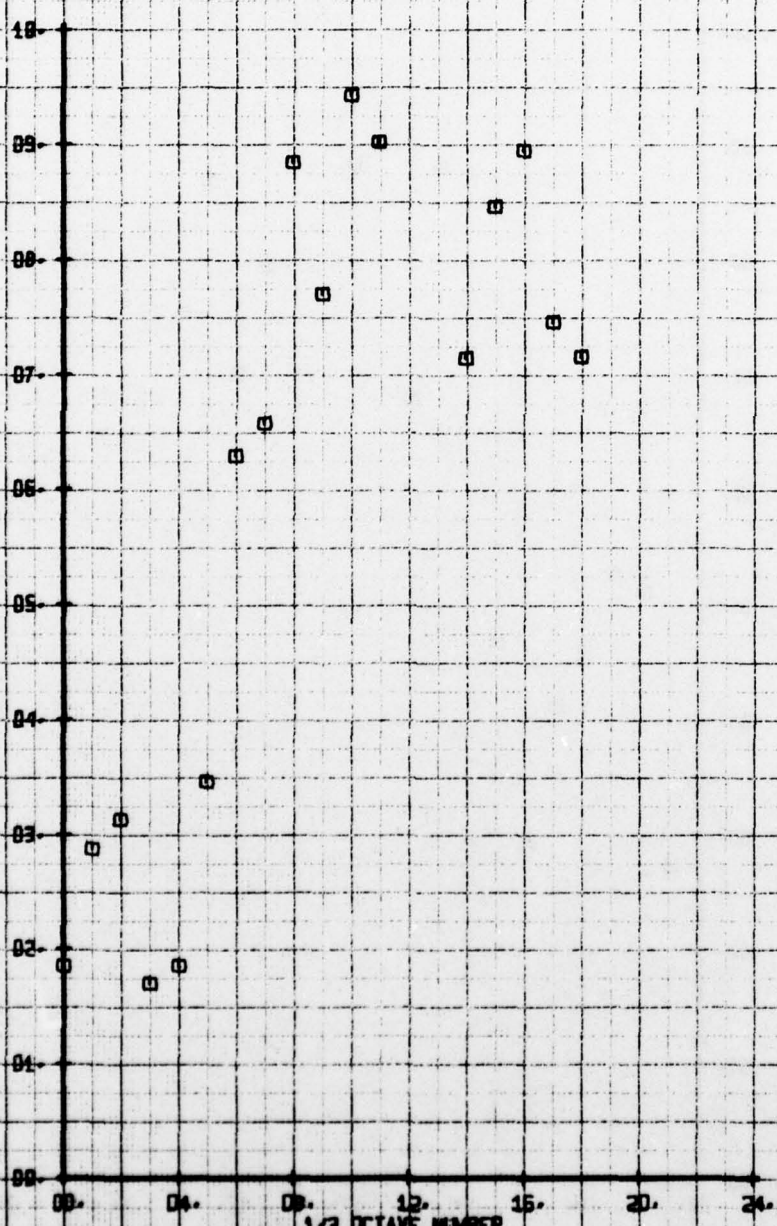


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W. UDDY 7-60 1.256.E4 150PSI
 RUN 200 TP 2

SYM
 □

LEGEND
 CM 66
 PARAMETER
 Y-ALPHA

Y-Y VELOCITY COMPONENT Y-ALPHA FPS

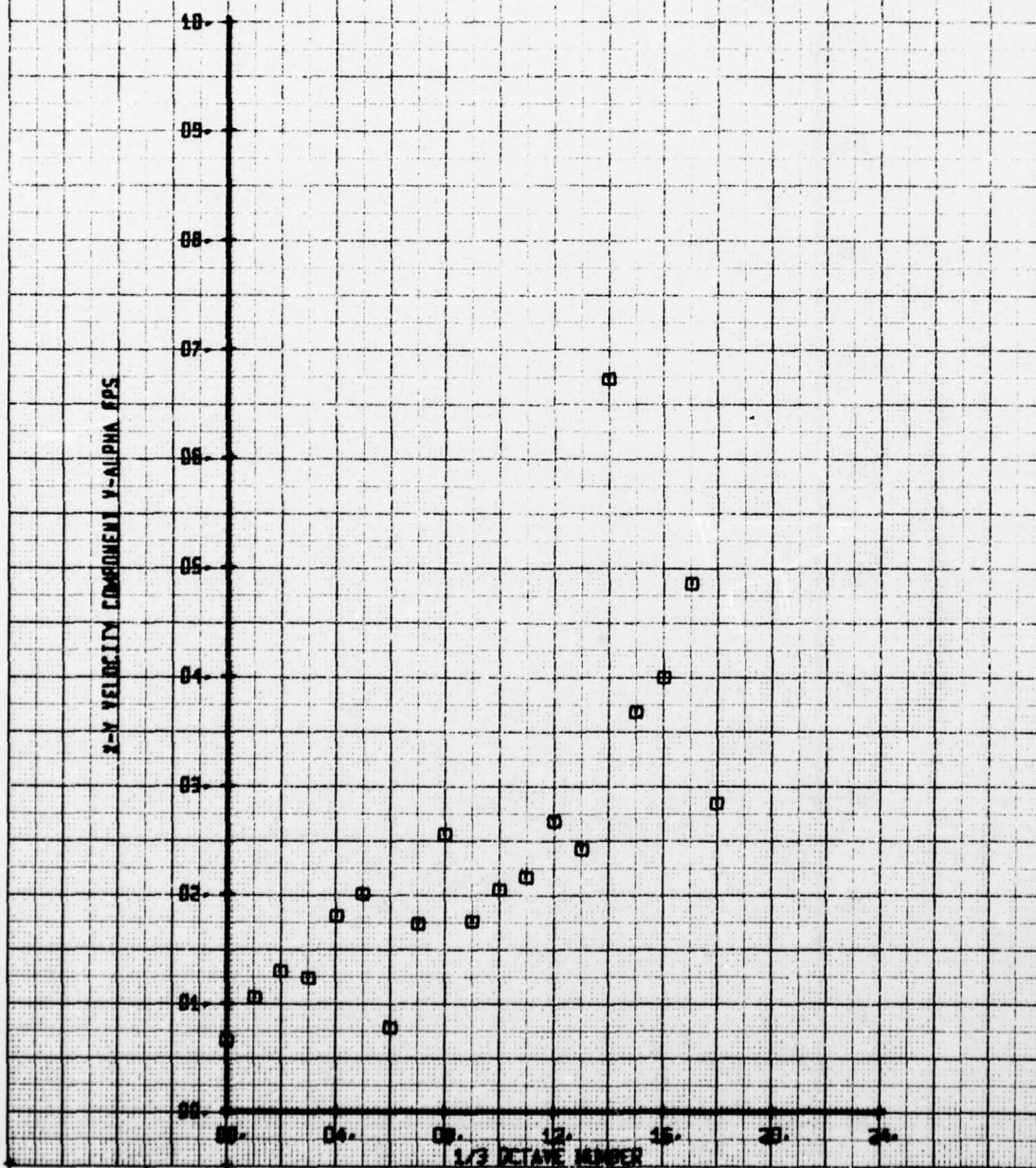


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W LRDY 7.60, 1.256, 64 150PSI
 RUN 200 TP 3

SYM
 □

CH
 66

LEGEND
 PARAMETER
 V-ALPHA



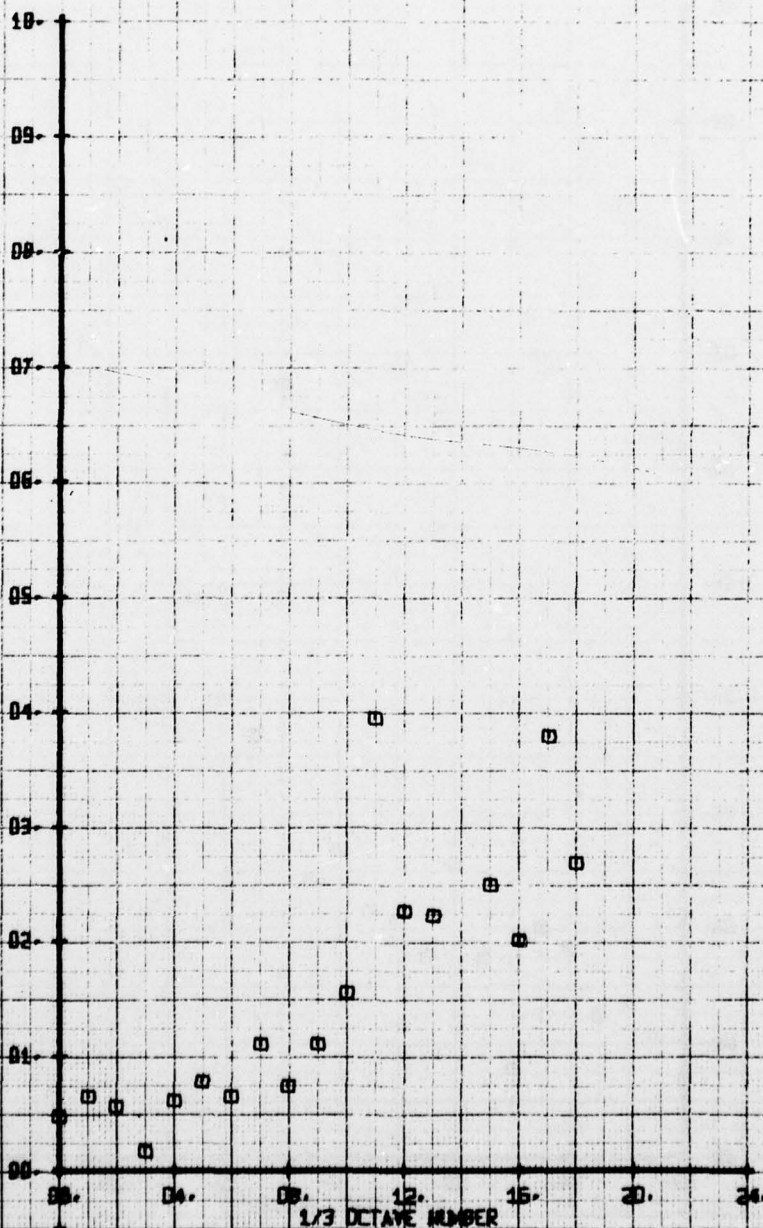
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W BODY 7.60,1.256,E4 150PSI
 RUN 200 TP 4

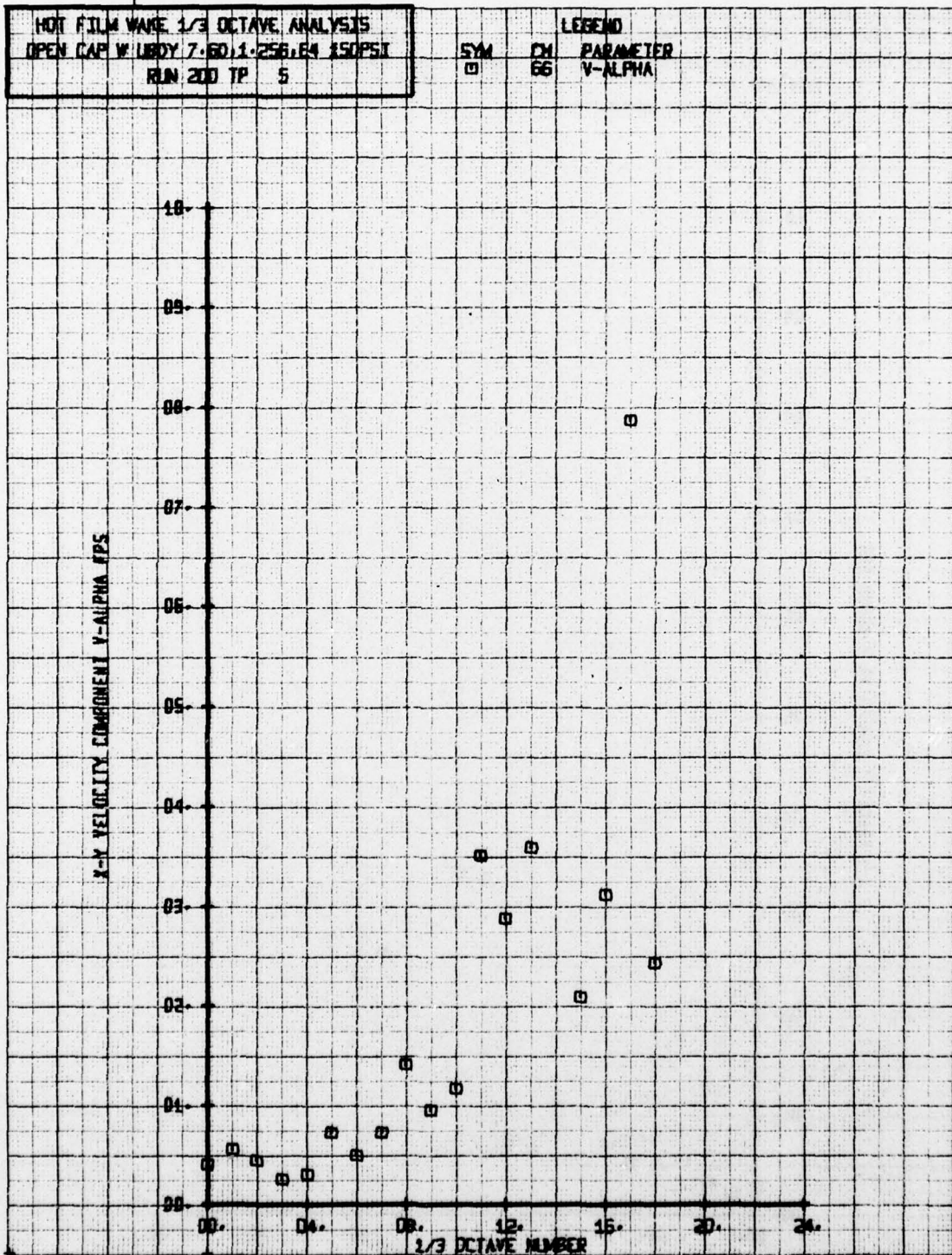
SYM
 □

CH
 66

LEGEND
 PARAMETER
 V-ALPHA

X-Y VELOCITY COMPONENT V-ALPHA FPS

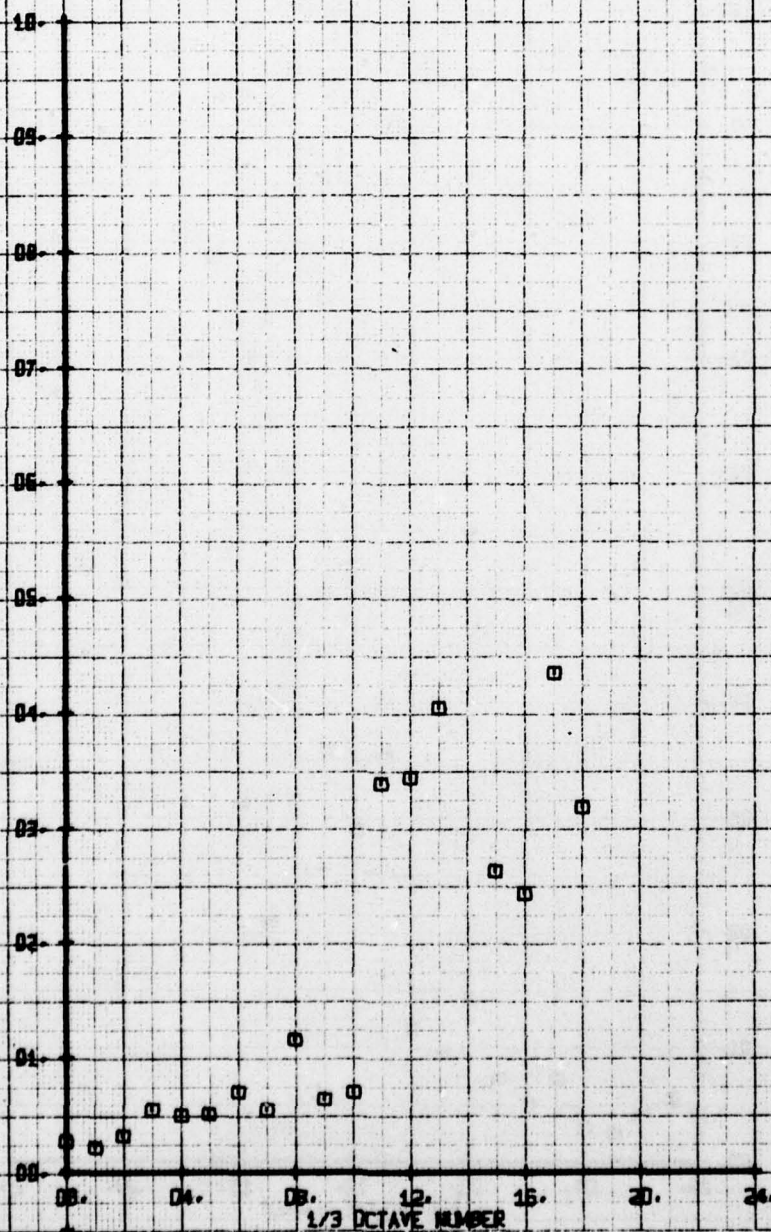


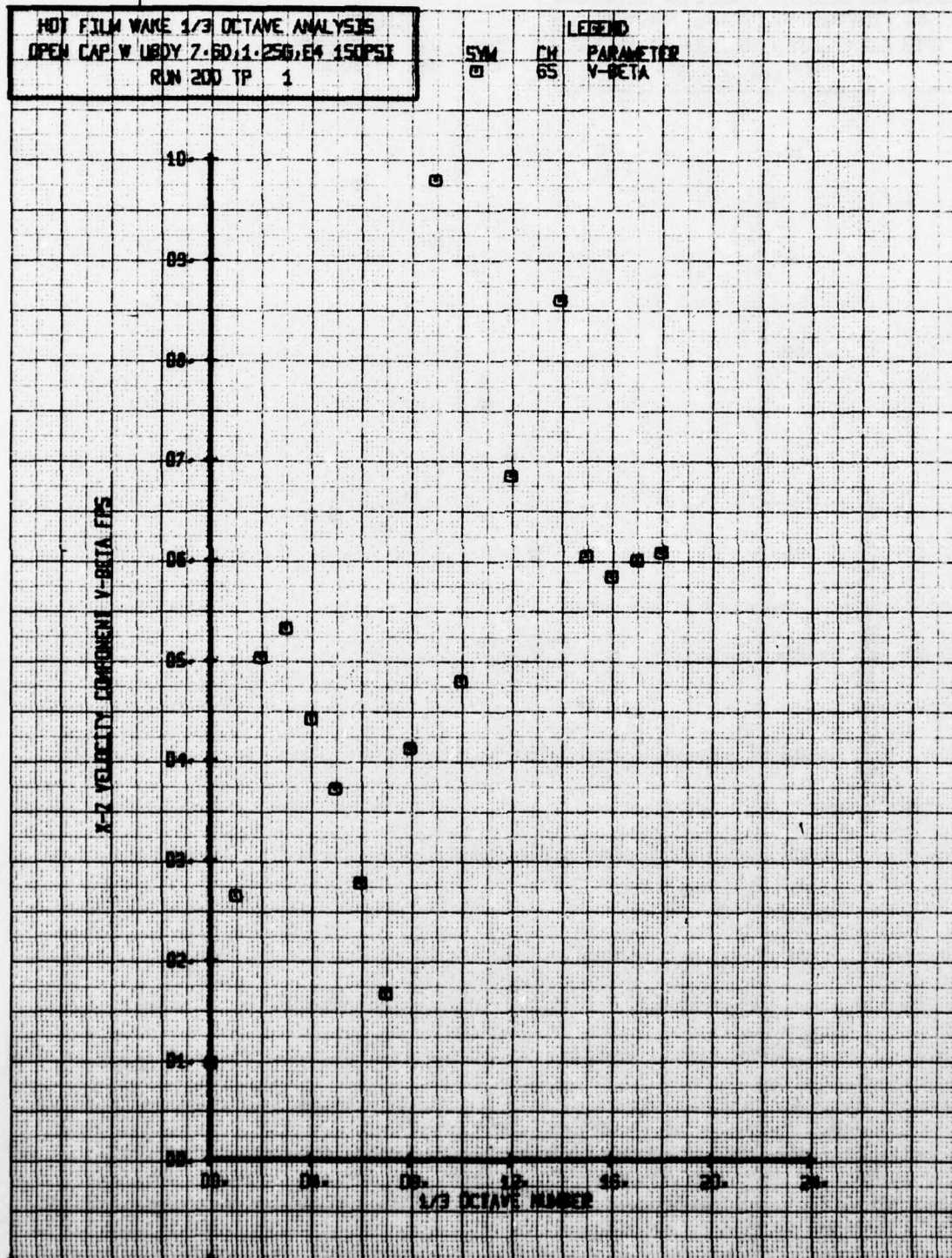


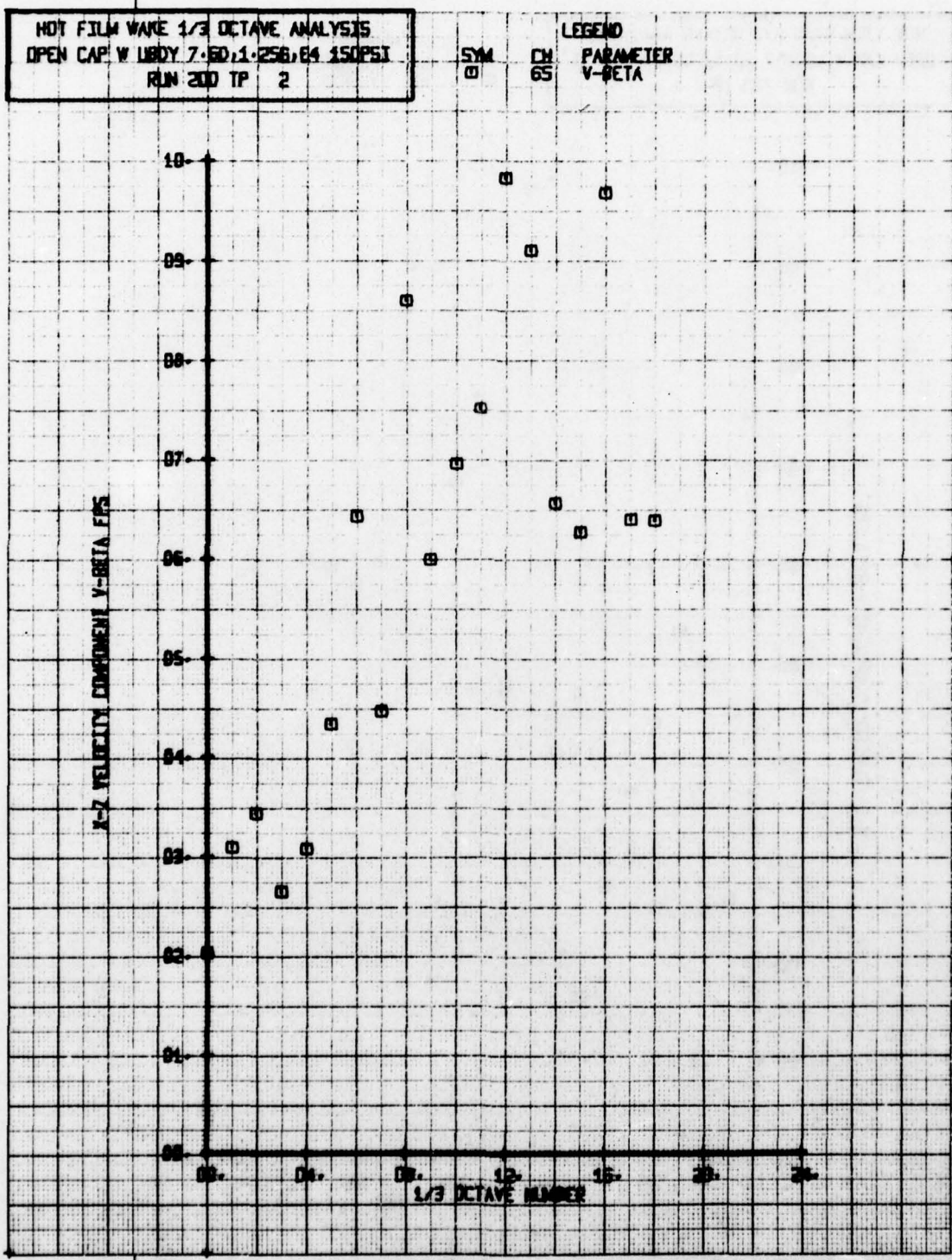
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W UDDY 7-60:1-256.64 150PSI
 RUN 200 TP 6

SYM	CH	PARAMETER
□	66	V-ALPHA

X-Y VELOCITY COMPONENT V-ALPHA FPS







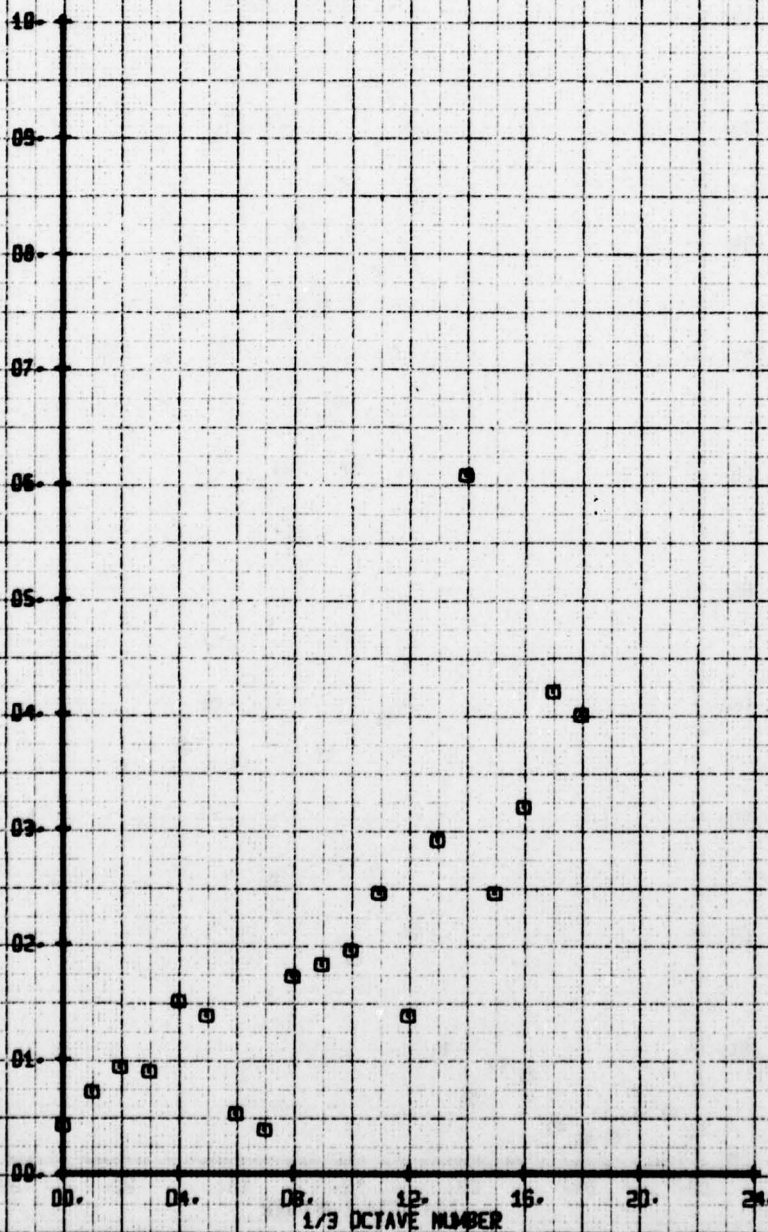
NOI FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W LIBDY 7-50, 1-256, E4 150PSI
 RUN 200 TP 3

SYM
 □

CH
 65

LEGEND
 PARAMETER
 V-BETA

X-Z VELOCITY COMPONENT V-BETA FPS



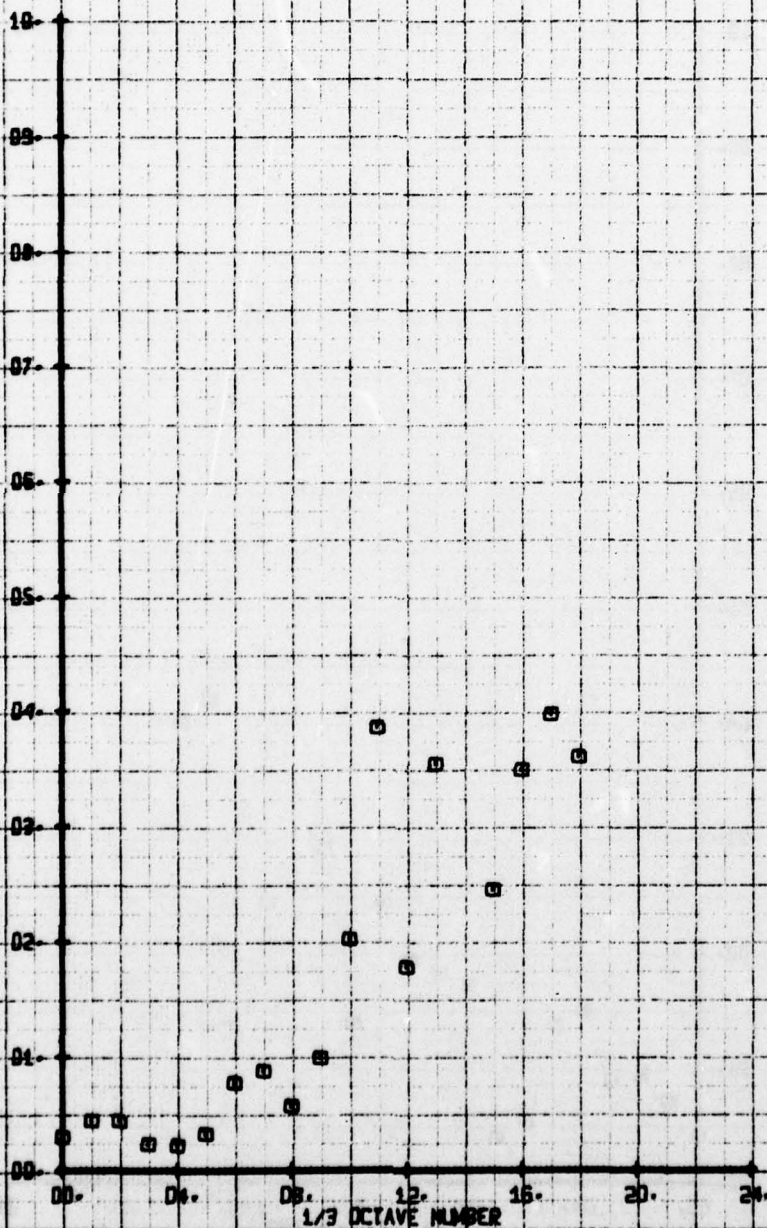
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W UDDY 7.60:1.256.E4 150PSI
 RUN 200 TP 4

SYM
 □

CH
 65

LEGEND
 PARAMETER
 V-BETA

X-Z VELOCITY COMPONENT V-BETA FPS



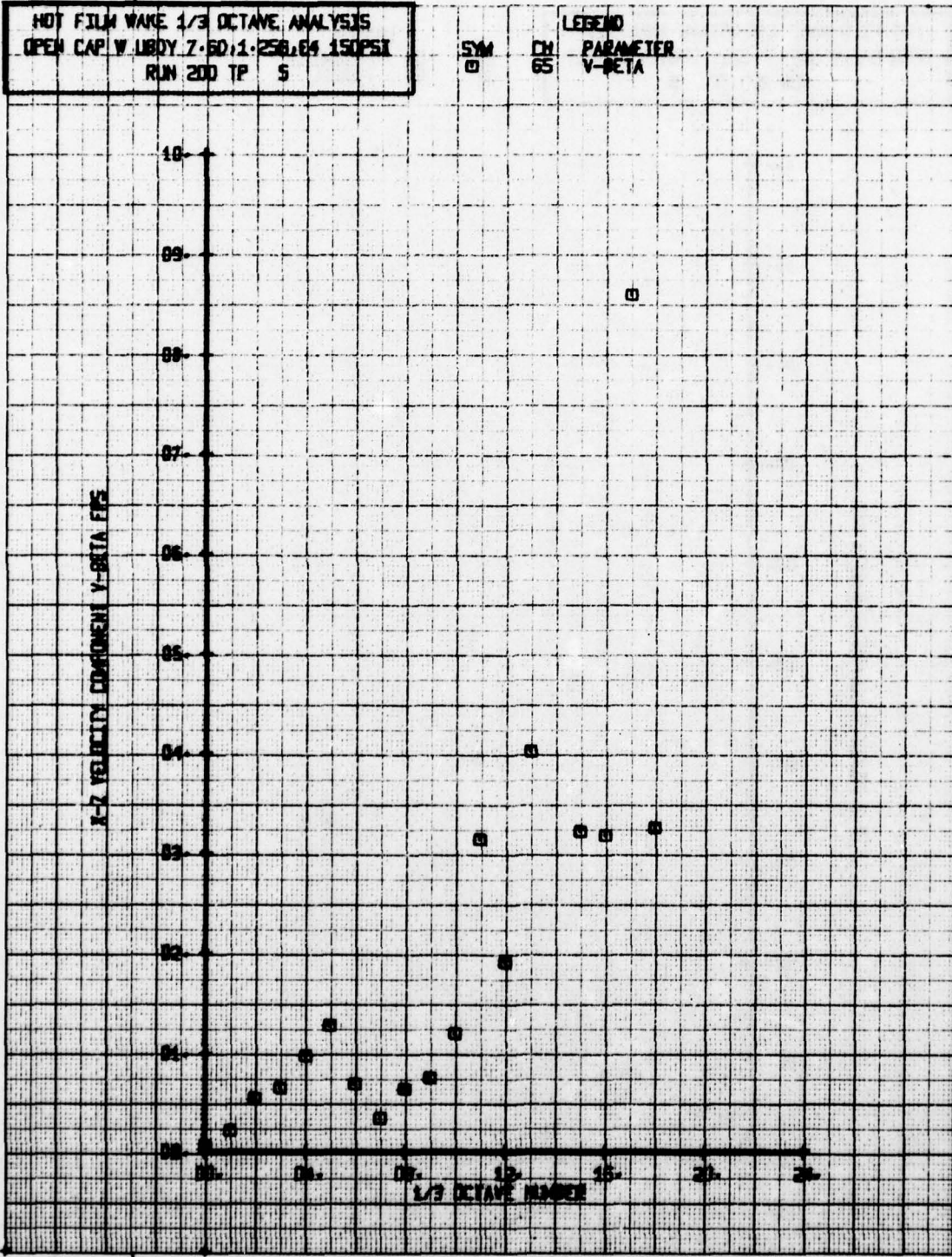
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W LBDY 7.60:1.258:64 150PSI
 RUN 200 TP S

SYM
 0

CH
 65

LEGEND
 PARAMETER
 V-BETA

1/2 VELOCITY COMPONENT V-BETA FPS



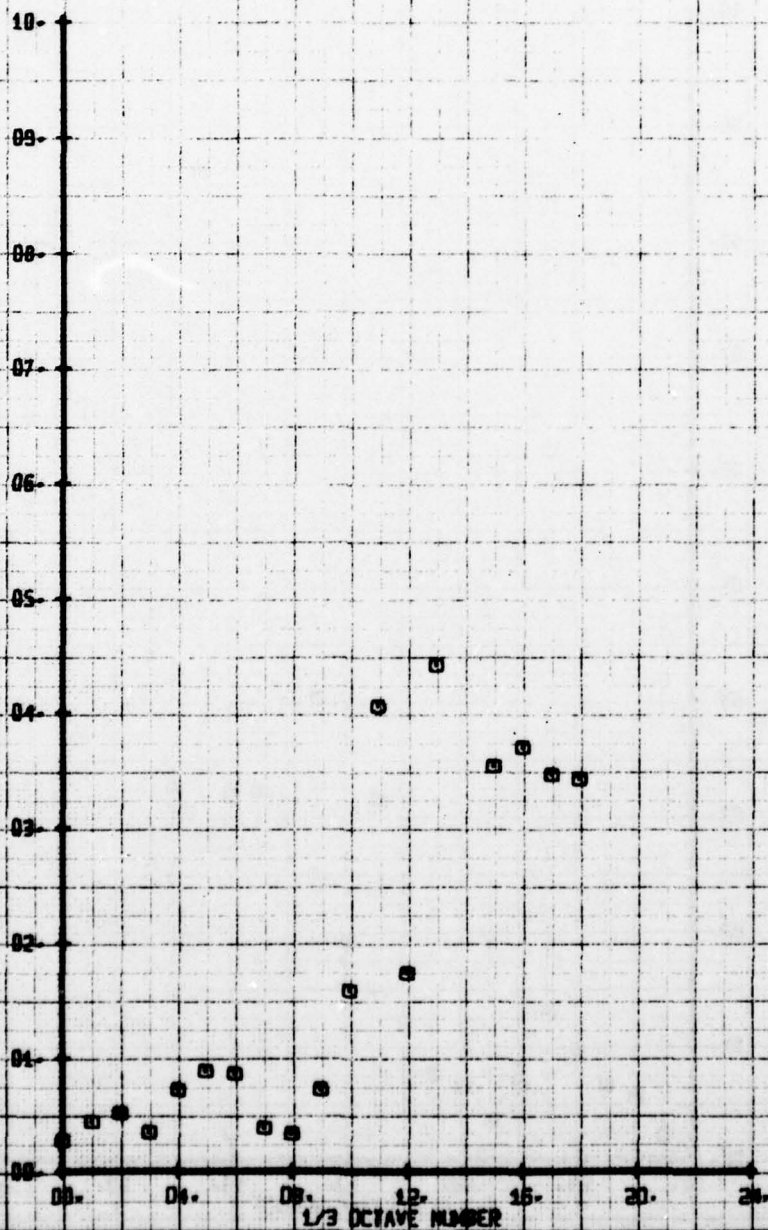
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W UBDY 7-6D:1-25G:E4 150PSI
 RUN 200 TP 6

SYM
 □

CH
 65

LEGEND
 PARAMETER
 V-BETA

X-Z VELOCITY COMPONENT V-BETA FPS

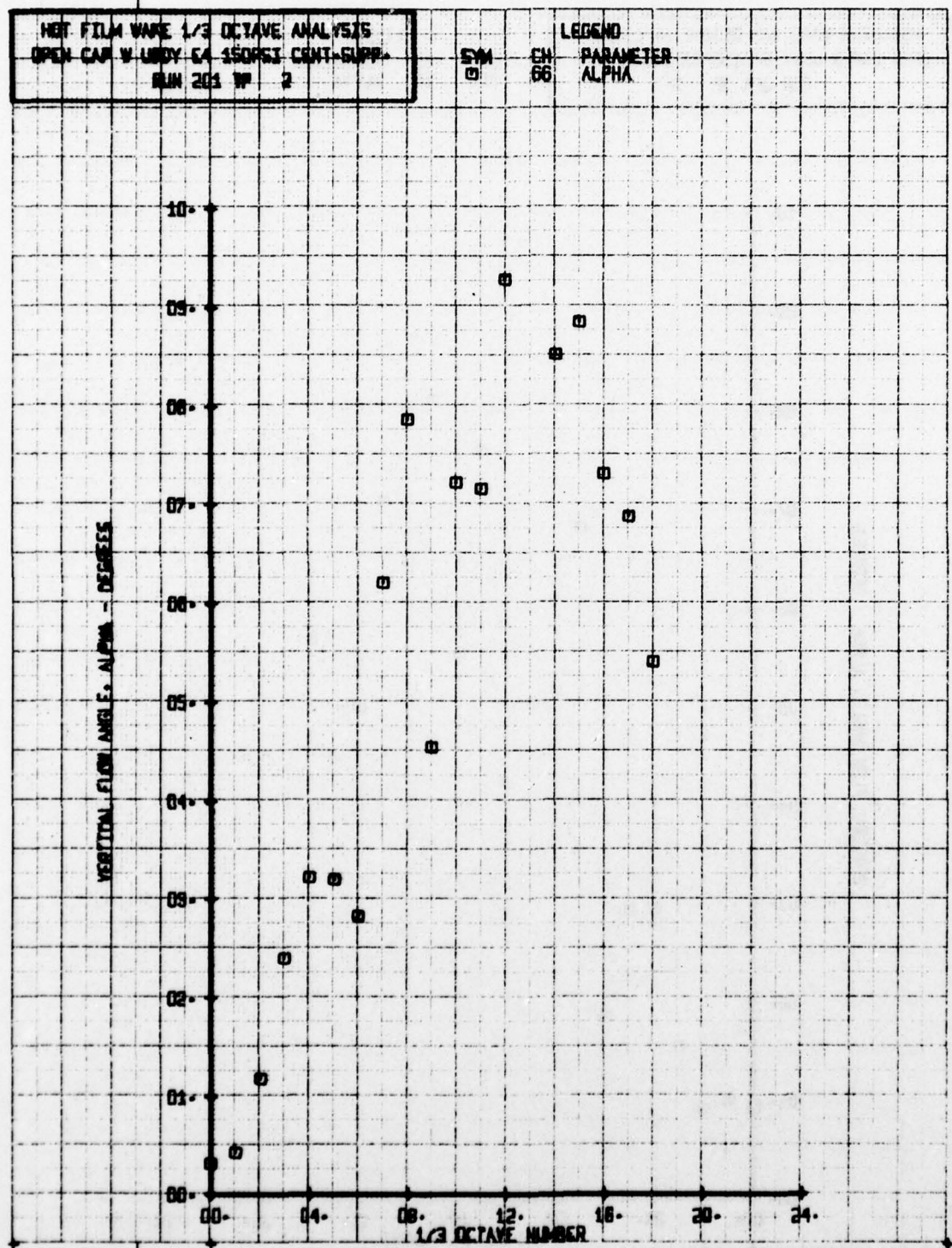


NET FILM WAVE 1/3 OCTAVE ANALYSIS
 OPEN CAV. V. LUDY 64 150PSI CONT. SUPP.
 RUN 201 WP 2

SYM
 □

CH
 66

LEGEND
 PARAMETER
 ALPHA



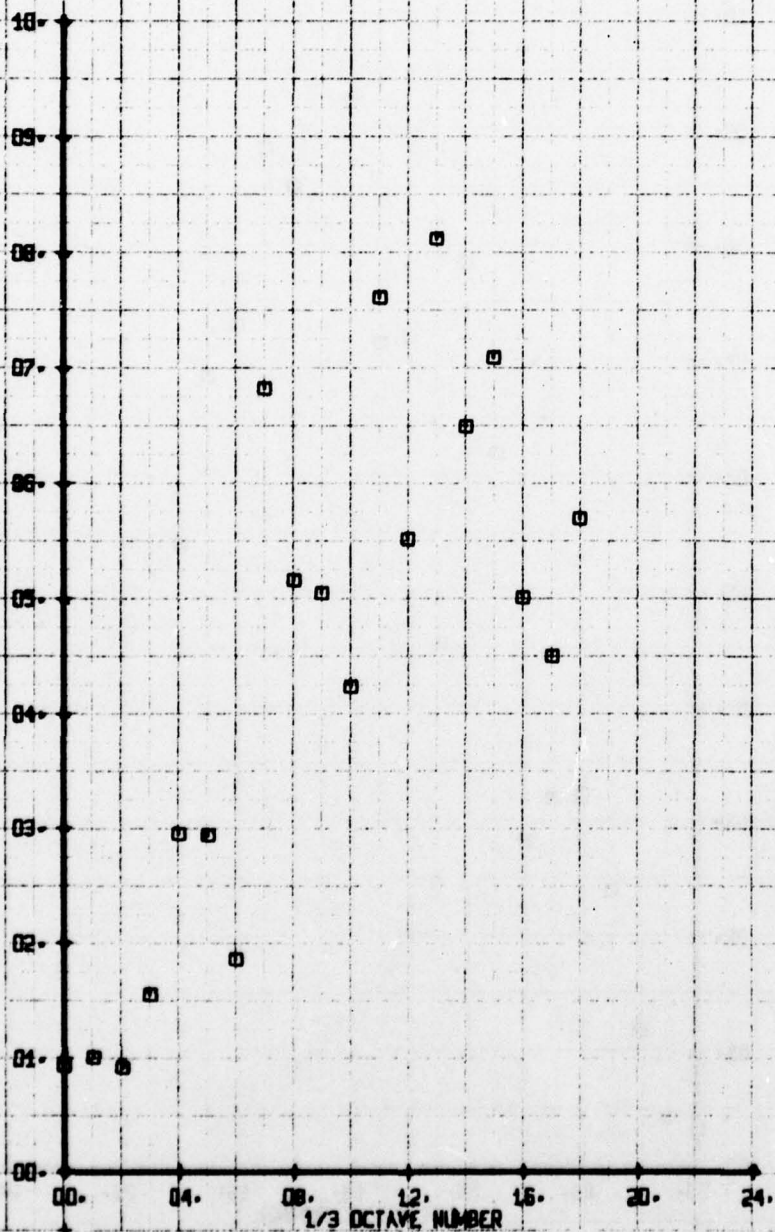
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W BODY E4 150PSI CENT-SUPP.
 RUN 201 TP 3

SYM
 □

CH
 66

LEGEND
 PARAMETER
 ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES

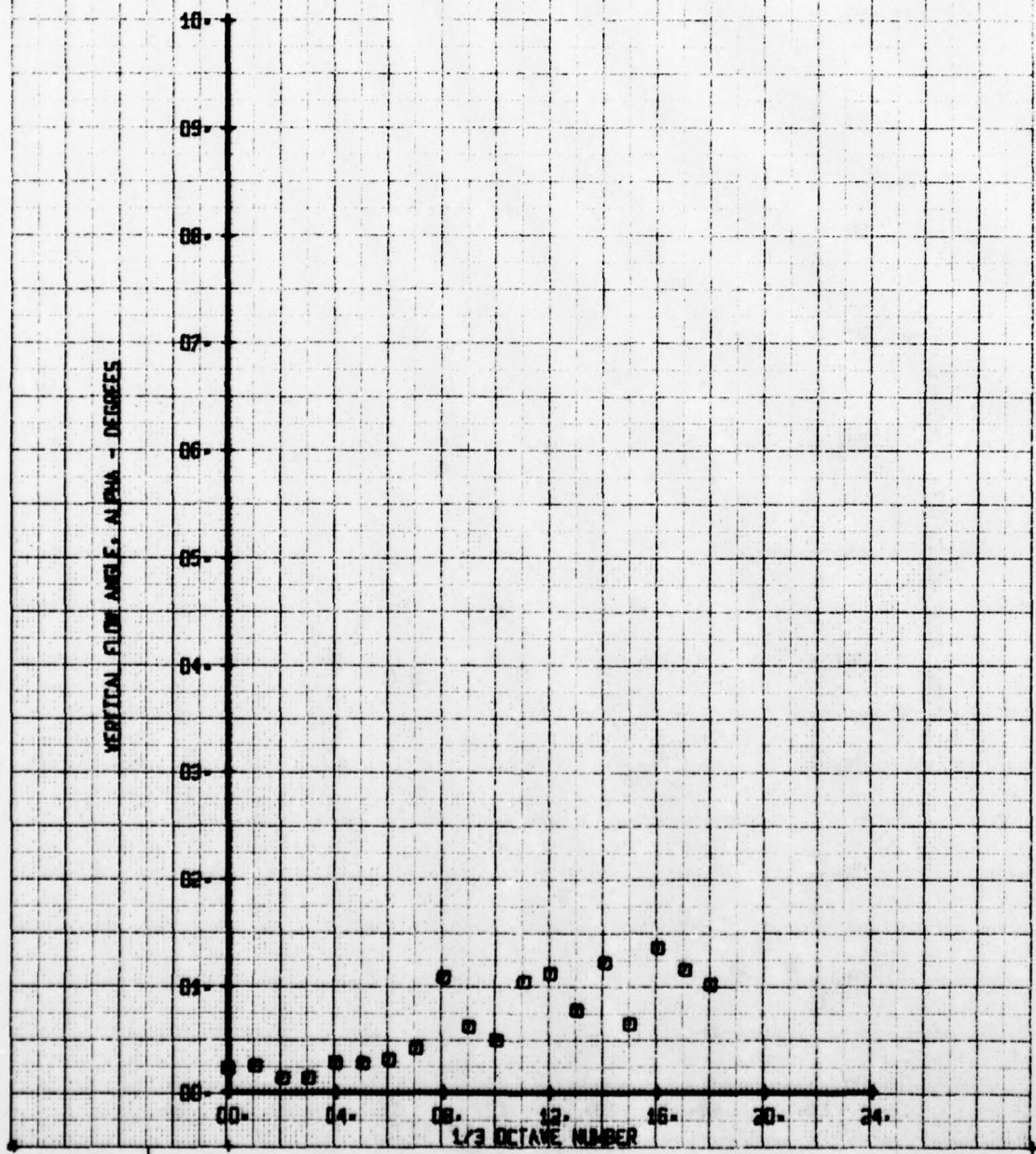


HOT FILM WARE 1/3 OCTAVE ANALYSIS
 OPEN CAP W UDDY E4 150PSI CENT-SUPP.
 RUN 201 TP 4

SYM
 □

LEGEND
 CH 66
 PARAMETER
 ALPHA

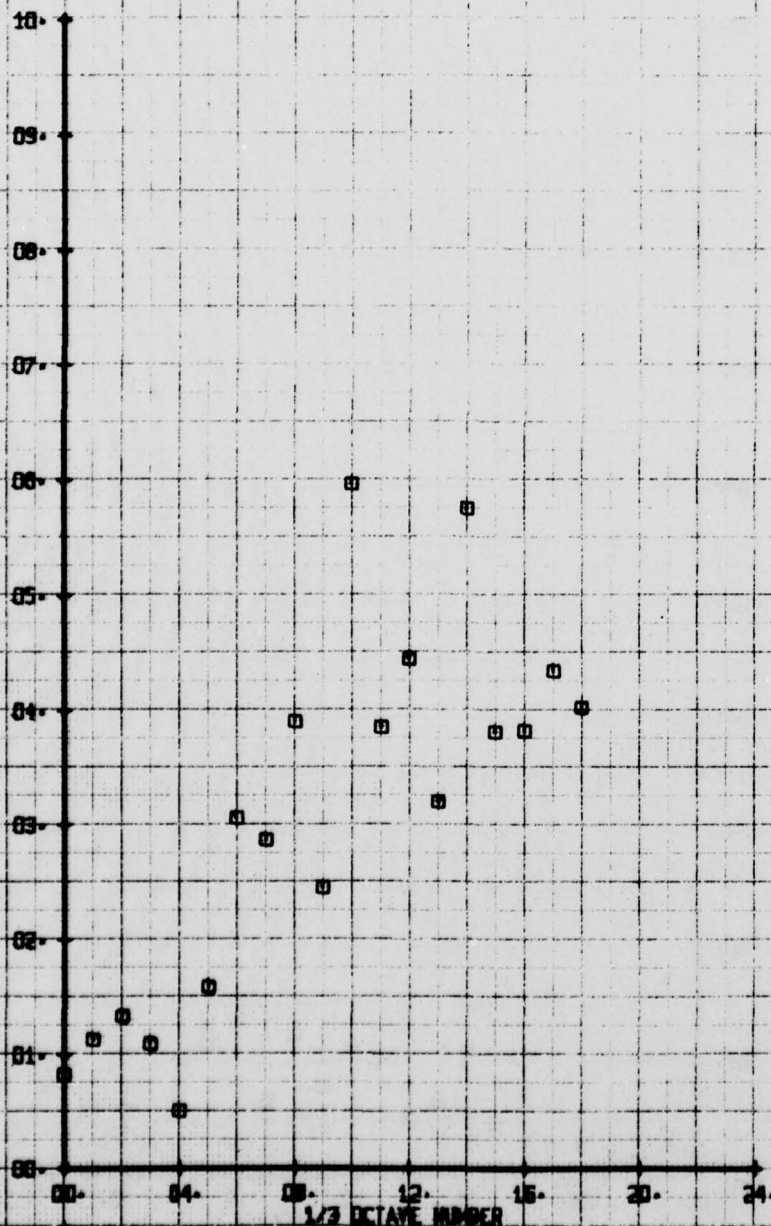
VERTICAL FLOW ANGLE, ALPHA - DEGREES



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W UDDY EA 150PSI CENT-SUPP.
 RUN 201 TP 2

SYM CH PARAMETER
 □ 65 BETA

LATERAL FLOW ANGLE, BETA - DEGREES



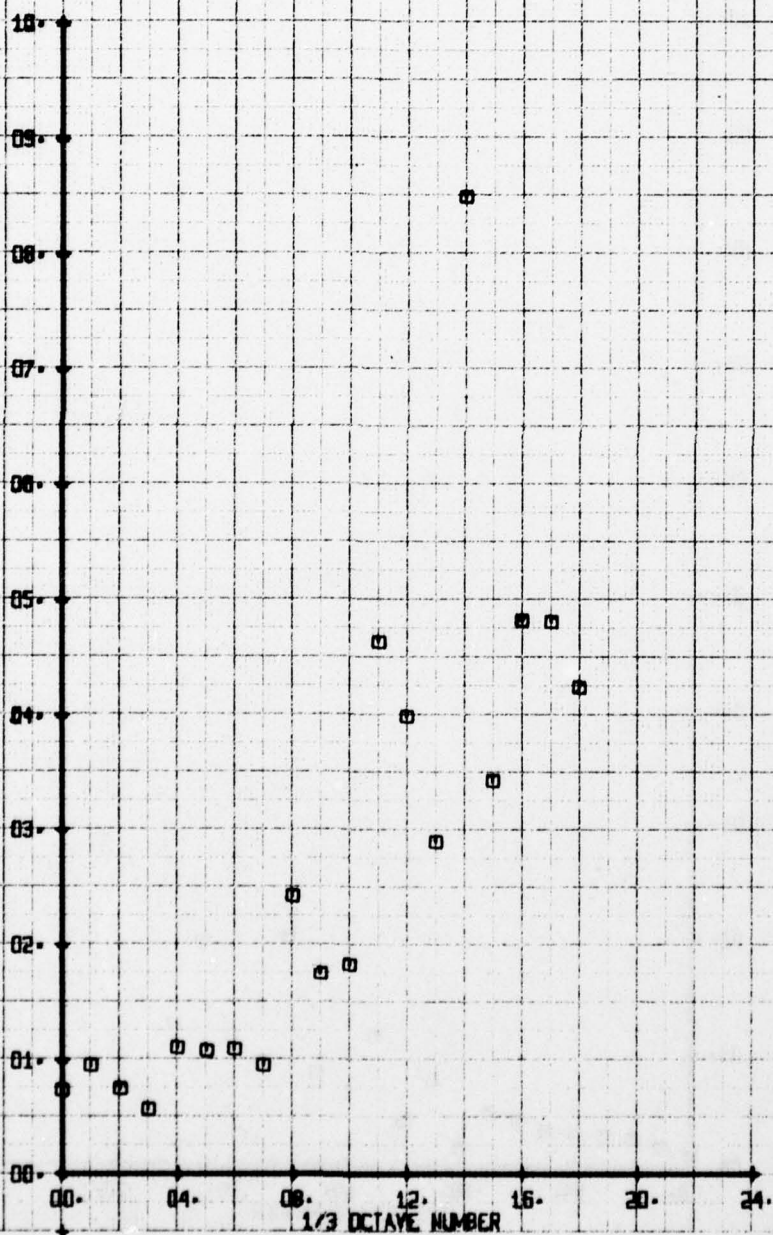
NOY FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W UDDY E4 150PSI CONT-SUPP.
 RUN 201 TP 3

SYM
 □

CH
 65

LEGEND
 PARAMETER
 BETA

LATERAL FLOW ANGLE, BETA - DEGREES



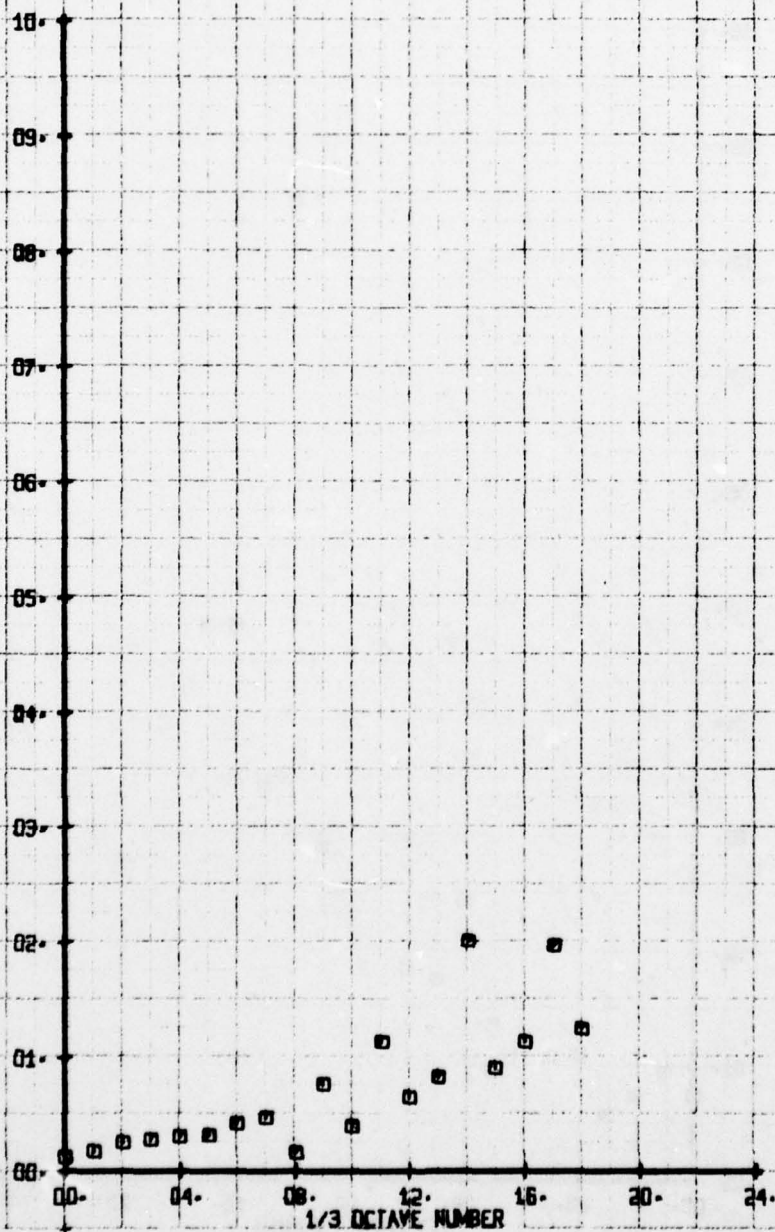
NOF FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W UDDY E4 150PSI CENT-SUPP.
 RUN 201 TP 4

SYM
 0

CH
 65

LEGEND
 PARAMETER
 BETA

LATERAL FLOW ANGLE, BETA - DEGREES

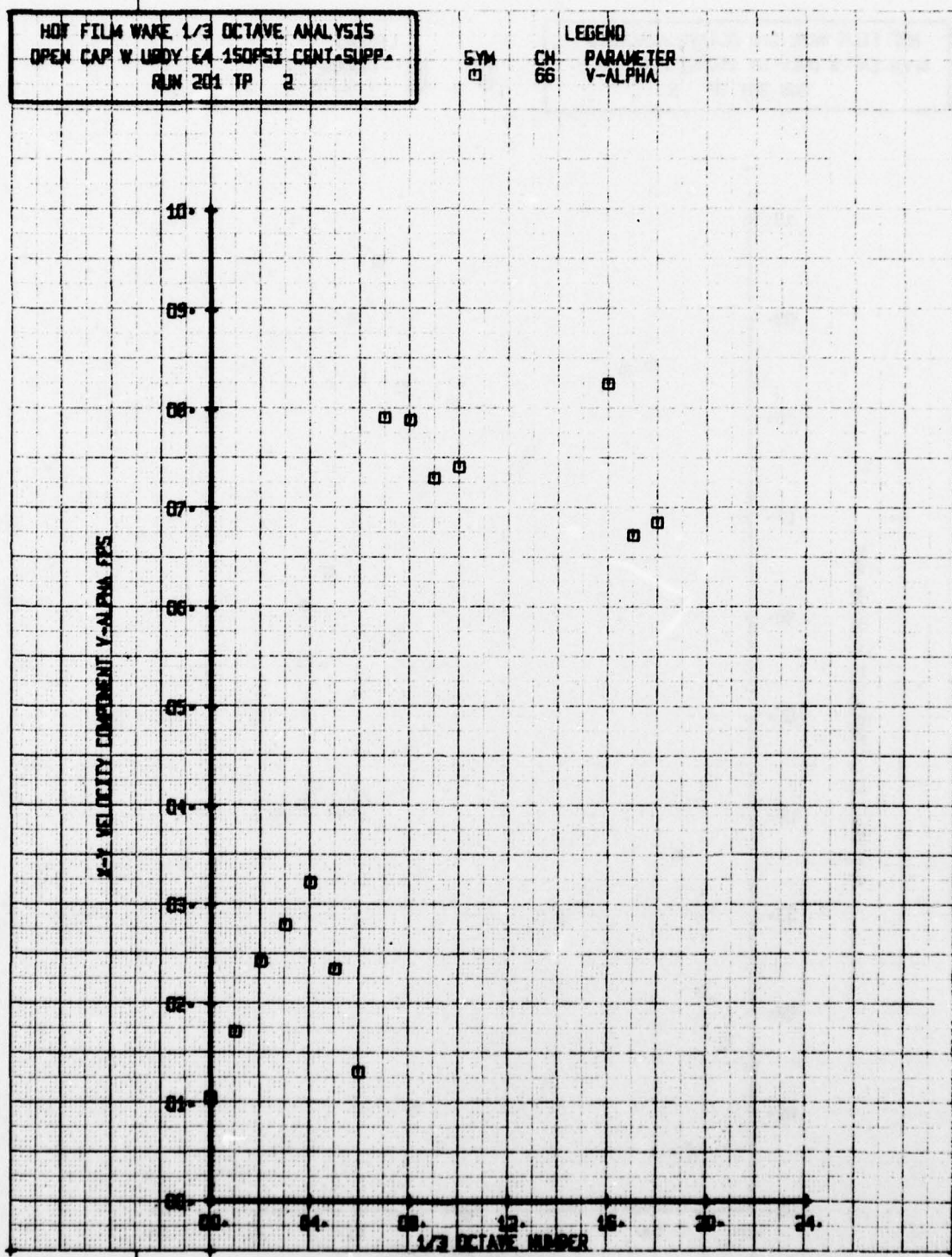


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W UDDY EA 150PSI CONT-SUPP.
 RUN 201 TP 2

SYM
 □

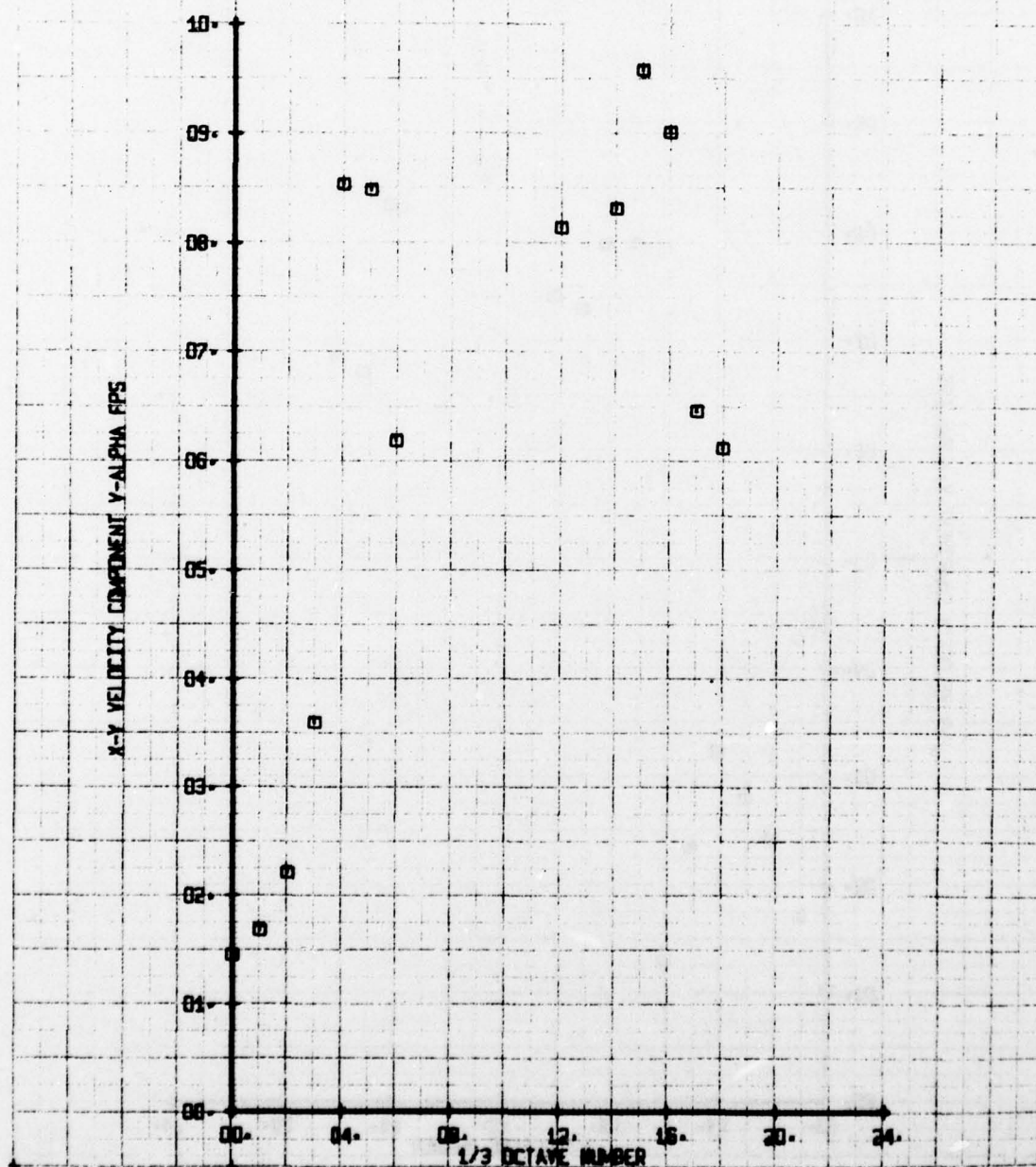
CH
 66

LEGEND
 PARAMETER
 V-ALPHA



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W UDDY E4 150PSI CENT-SUPP.
 RUN 201 TP 3

SYM CH PARAMETER
 □ 66 V-ALPHA



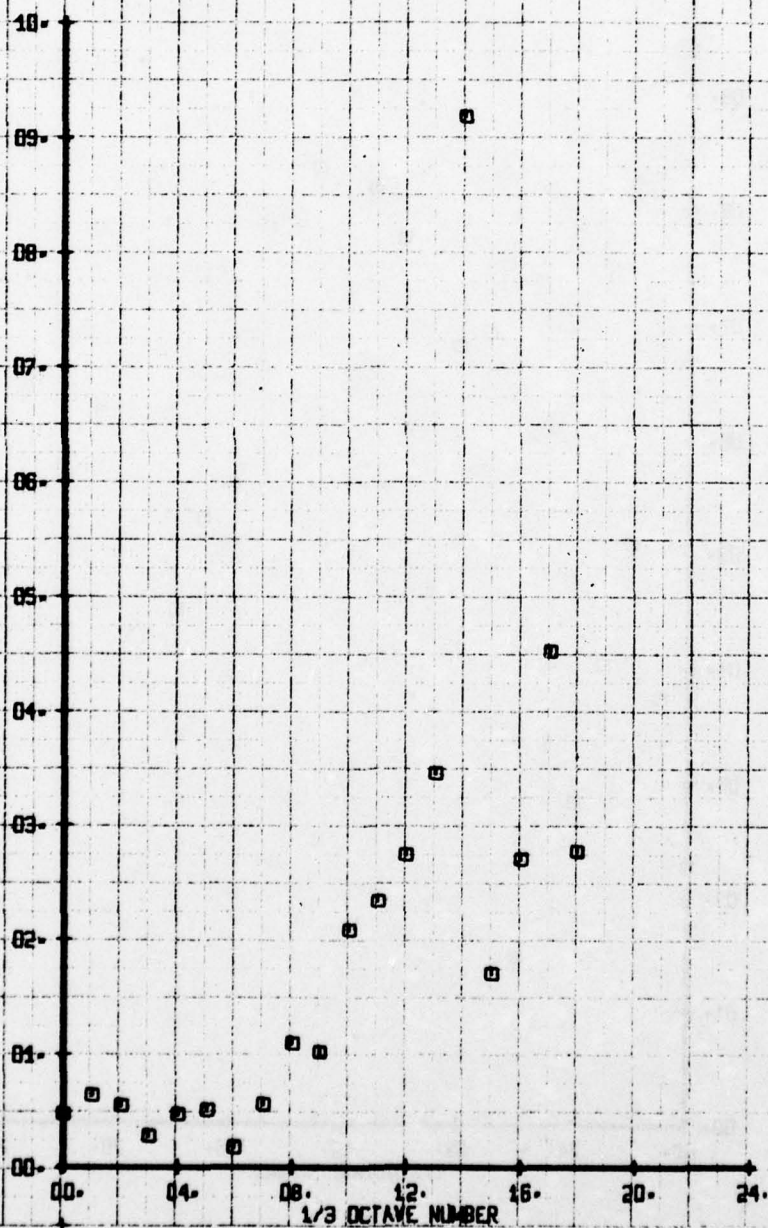
HOT FILM WARE 1/3 OCTAVE ANALYSIS
 OPEN CAP W. LBOY E4 150PSI CONT. SUPP.
 RUN 201 TP 4

SYM
 0

CH
 66

LEGEND
 PARAMETER
 V-ALPHA

X-Y VELOCITY COMPONENT V-ALPHA RMS



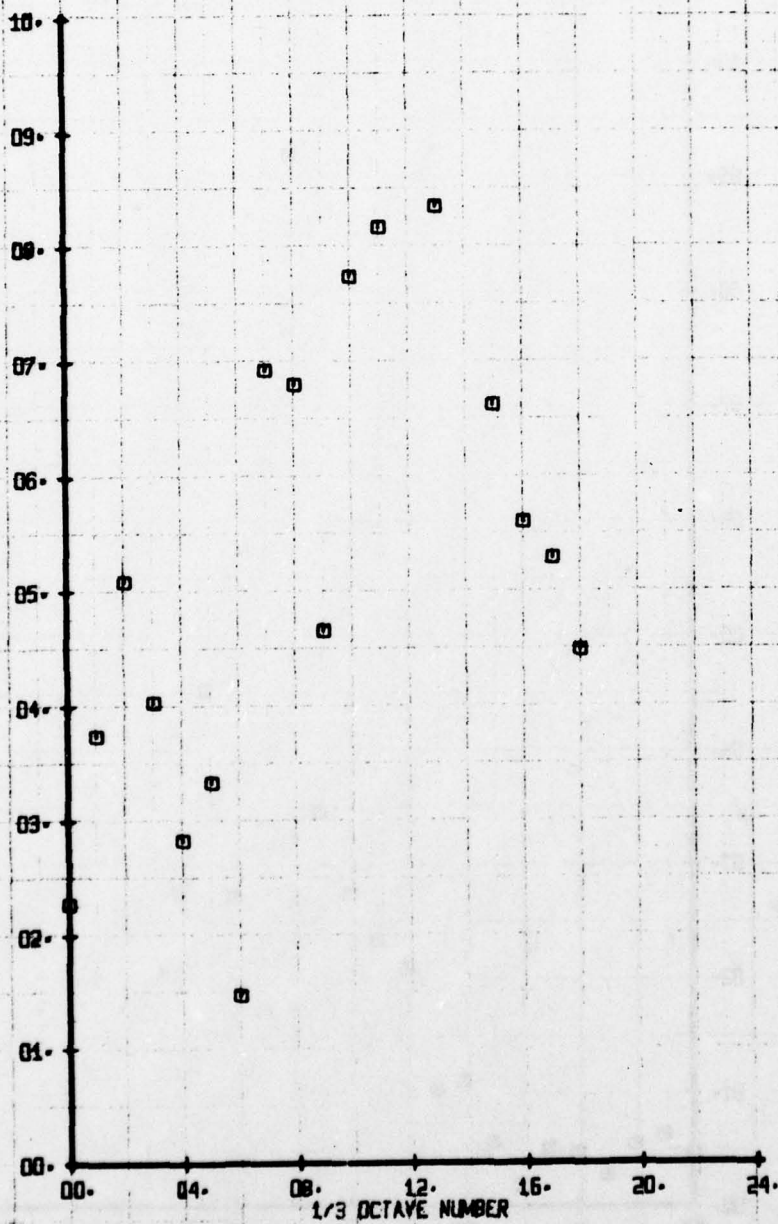
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W UDDY E4 150PSI CENT-SUPP.
 RUN 201 TP 2

SYM
 □

CH
 65

LEGEND
 PARAMETER
 V-BETA

X-Z VELOCITY COMPONENT V-BETA FPS



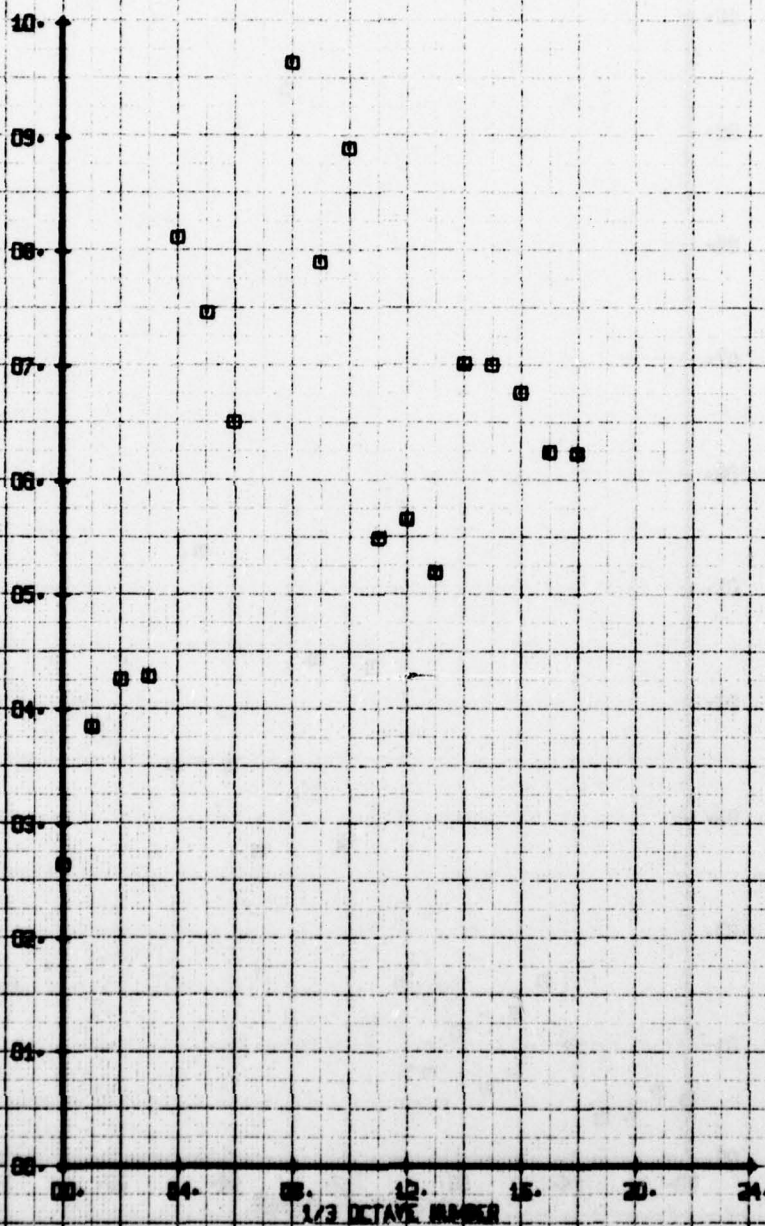
NOT FILM WAVE 1/3 OCTAVE ANALYSIS
 OPEN CAP V-UBDY E4 150PSI CONT-SUPP.
 RUN 201 TP 3

SYM
 □

CH
 65

LEGEND
 PARAMETER
 V-BETA

1-2 VELOCITY COMPONENT V-BETA FPS

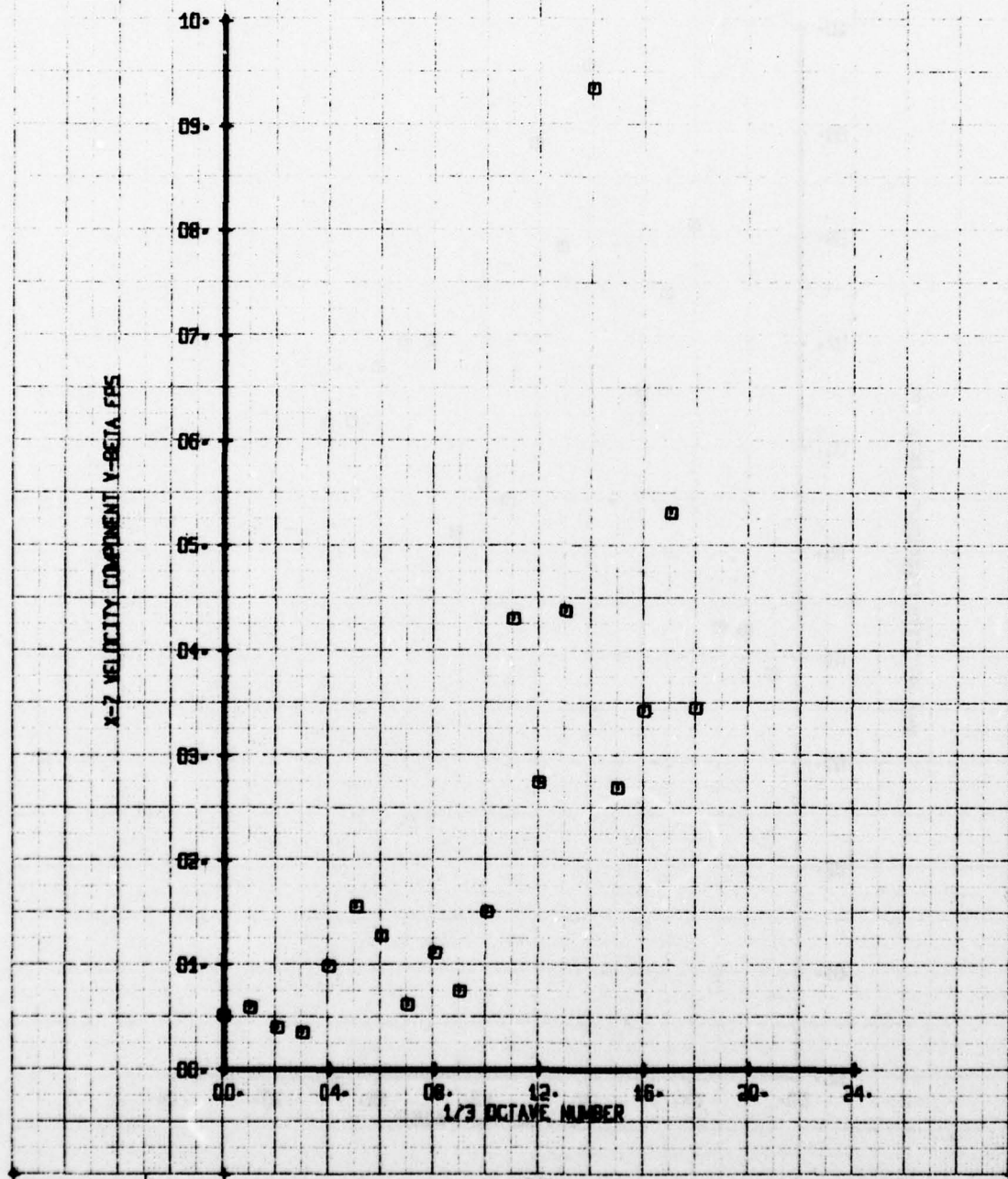


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 OPEN CAP W UDDY E4 150PSI CENT-SUPP.
 RUN 201 TP 4

SYM
 □

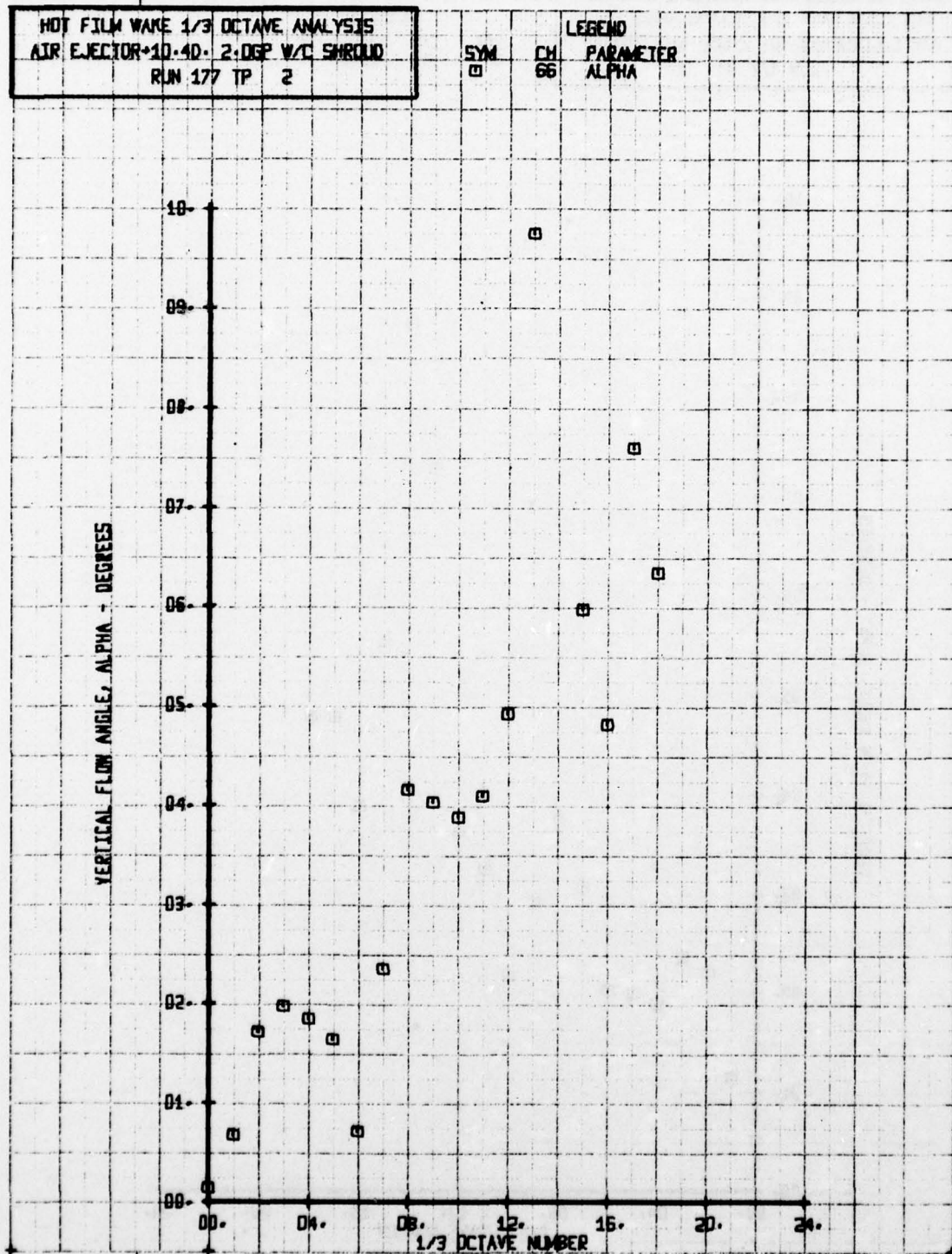
CH
 65

LEGEND
 PARAMETER
 V-BETA



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECTOR-10-40- 2-DEP W/C SHROUD
 RUN 177 TP 2

SYM CH
 □ 66
 LEGEND
 PARAMETER
 ALPHA



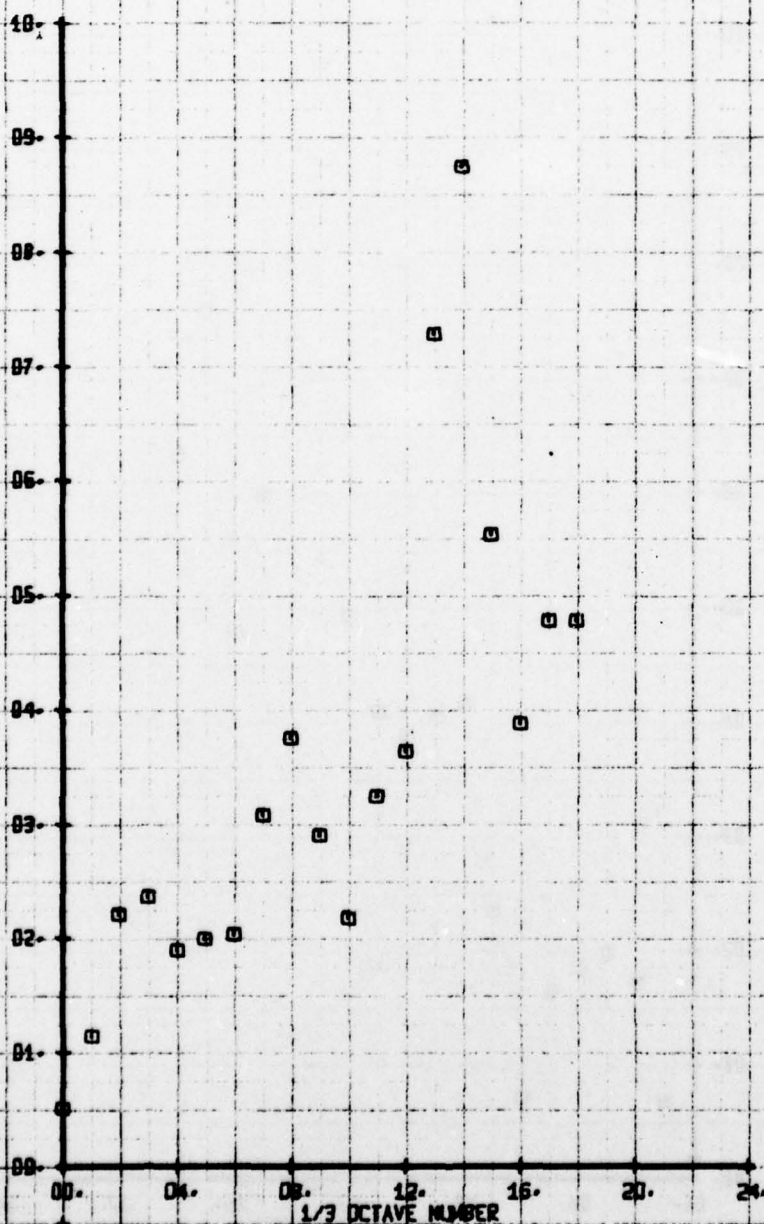
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECTOR-10-40- 2-DEP W/C SHROUD
 RUN 177 TP 3

SYM
 □

CH
 66

LEGEND
 PARAMETER
 ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES



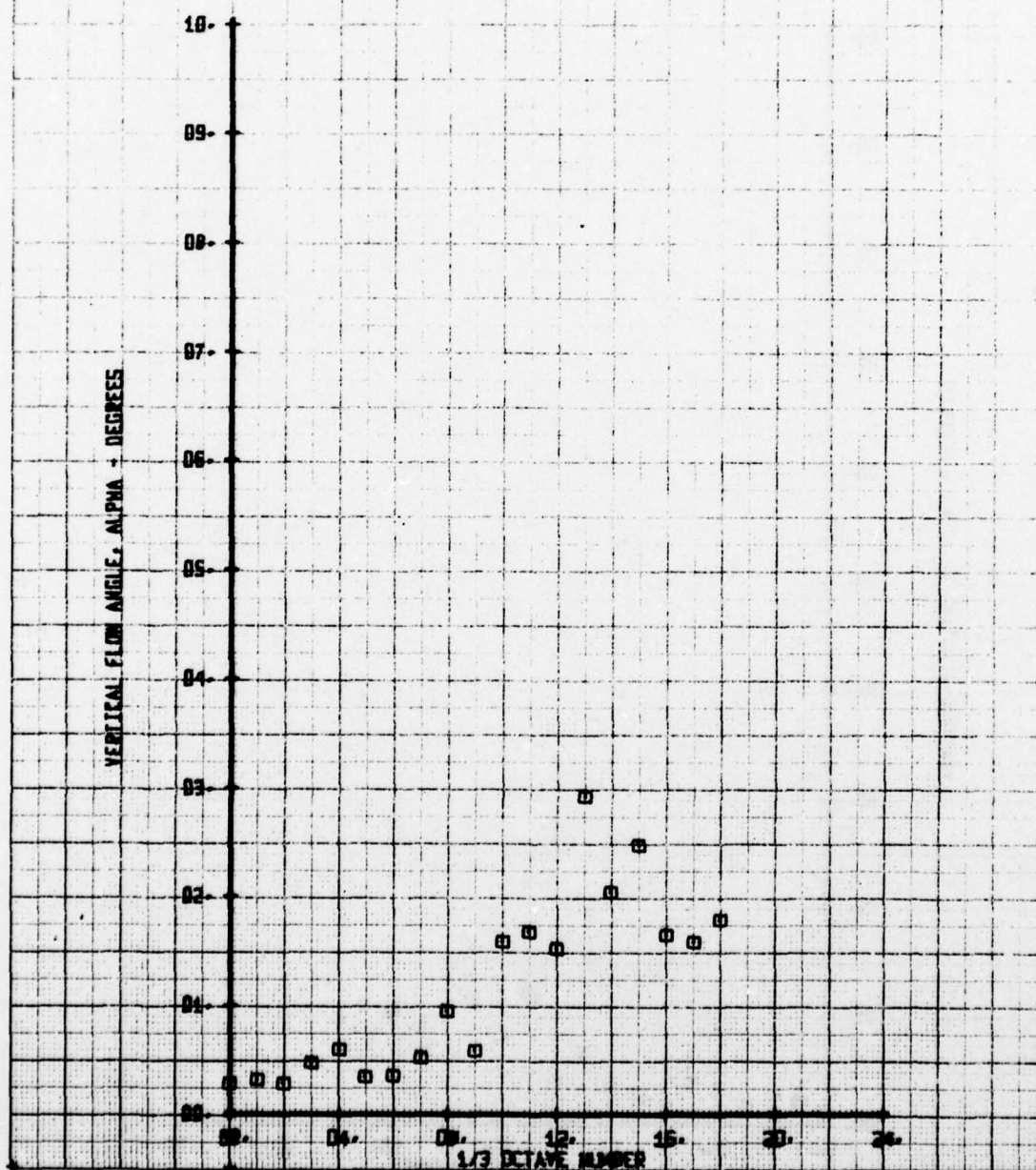
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECTOR+10-40- 2-DBP W/C SHROUD
 RUN 177 TP 4

SYM
 □

CH
 66

LEGEND
 PARAMETER
 ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES



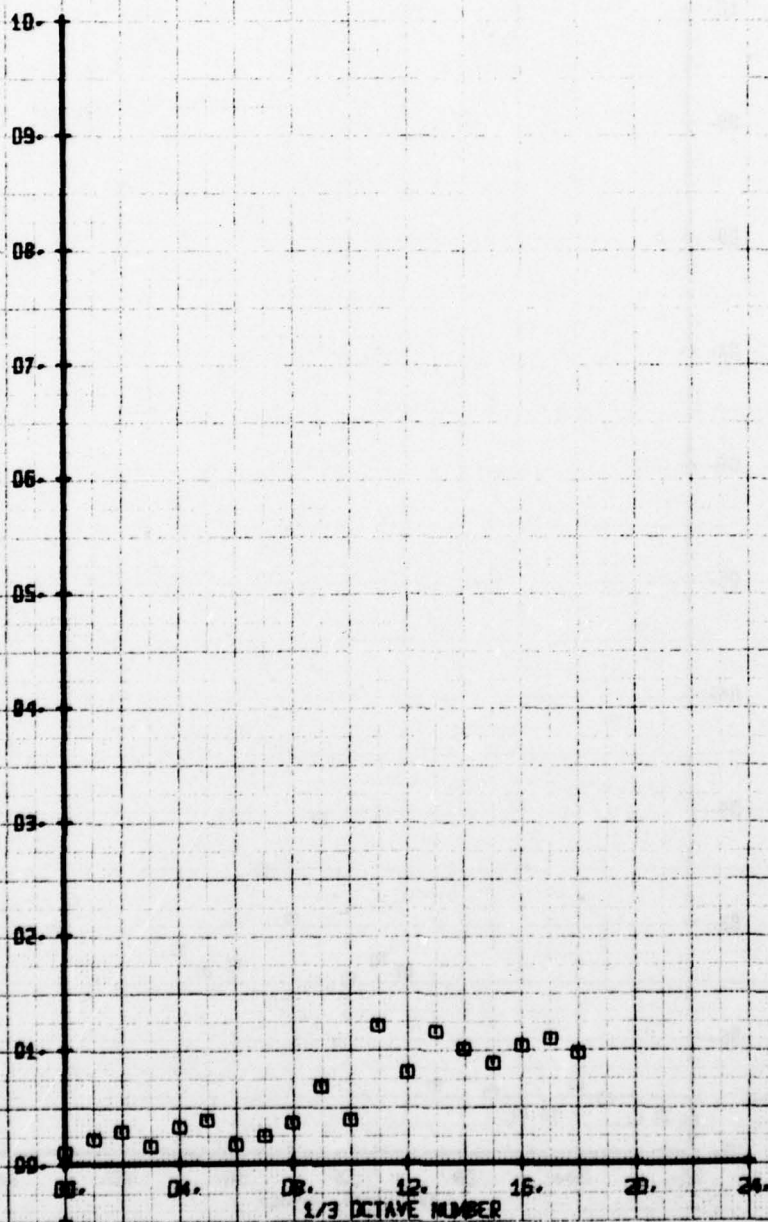
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECTOR-10-40- 2-DEP W/C SHROUD
 RUN 177 TP 5

SYM
 □

CH
 66

LEGEND
 PARAMETER
 ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES



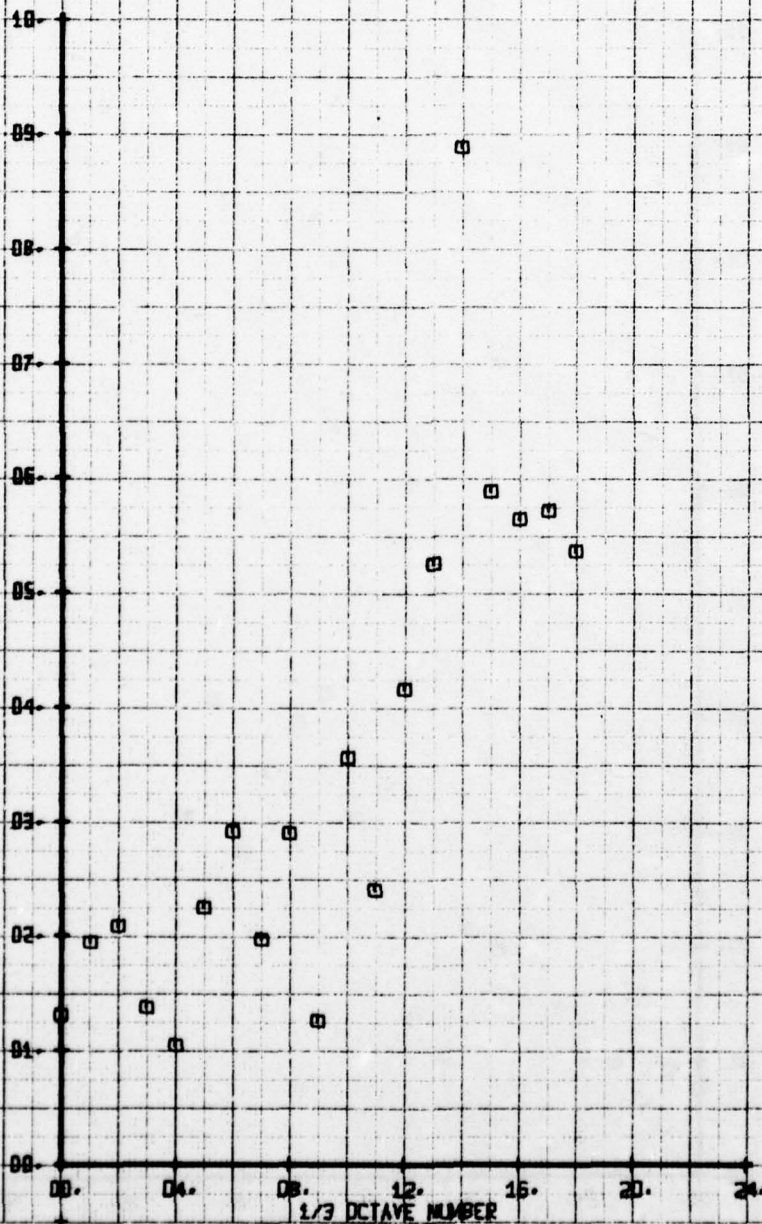
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECTOR-10-40- 2-0GP W/O SHROUD
 RUN 177 TP 2

SYM
 □

CH
 65

LEGEND
 PARAMETER
 BETA

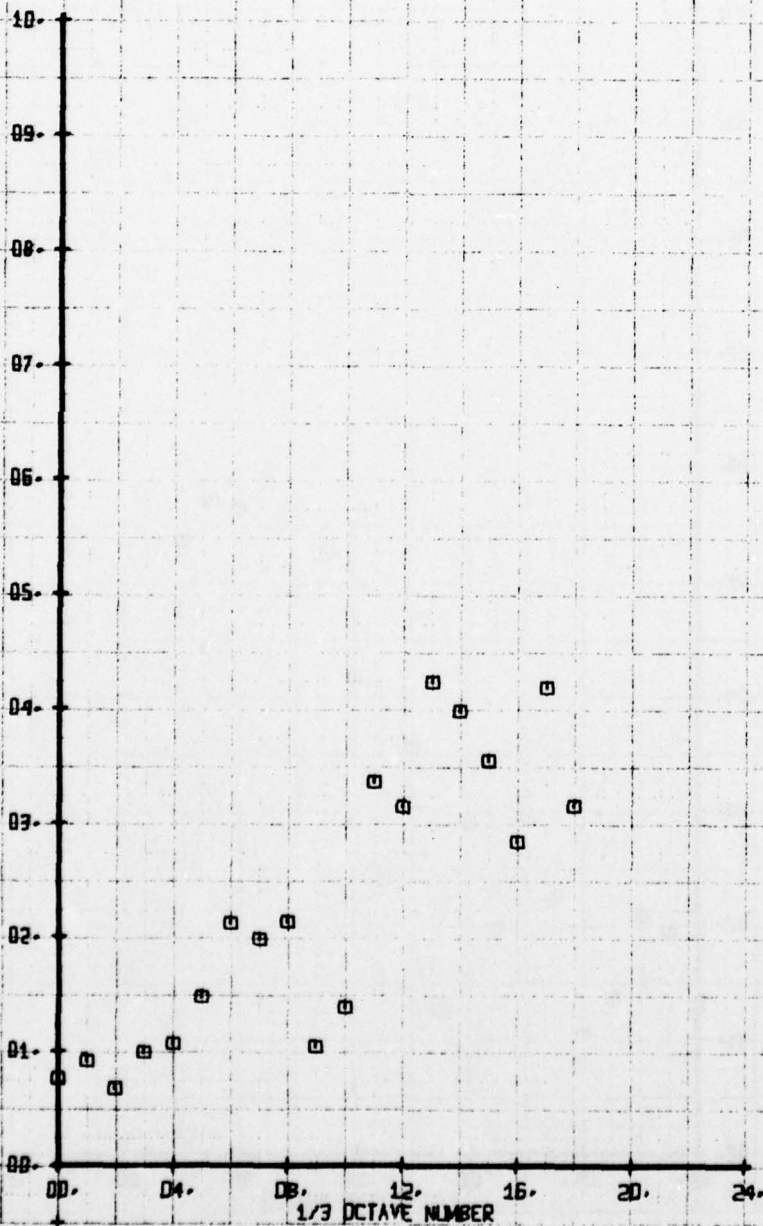
LATERAL FLOW ANGLE, BETA - DEGREES



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECTOR+10-40- 2-DEG W/C SHROUD
 RUN 177 TP 3

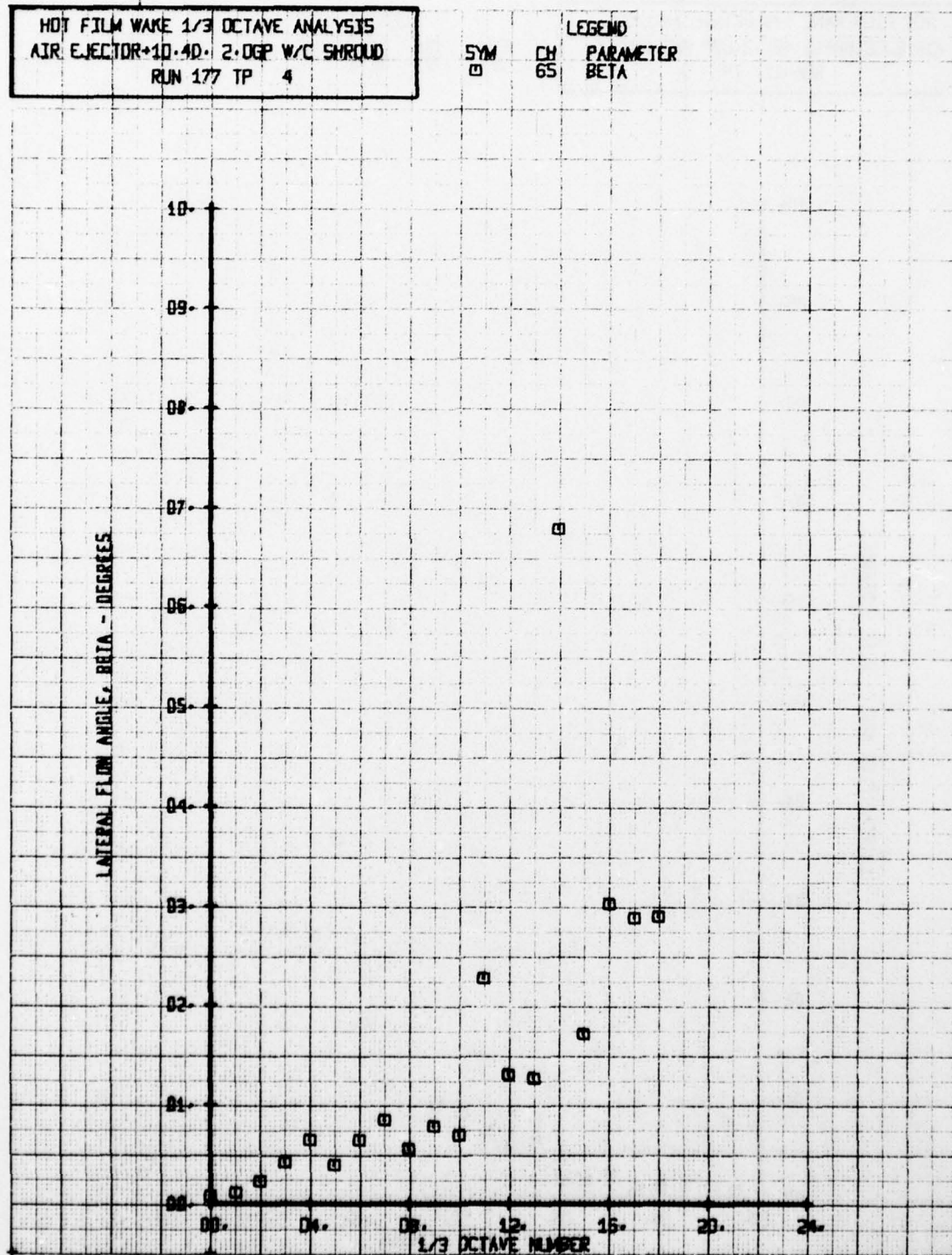
SYM	CH	LEGEND
□	65	PARAMETER BETA

LATERAL FLOW ANGLE, BETA - DEGREES



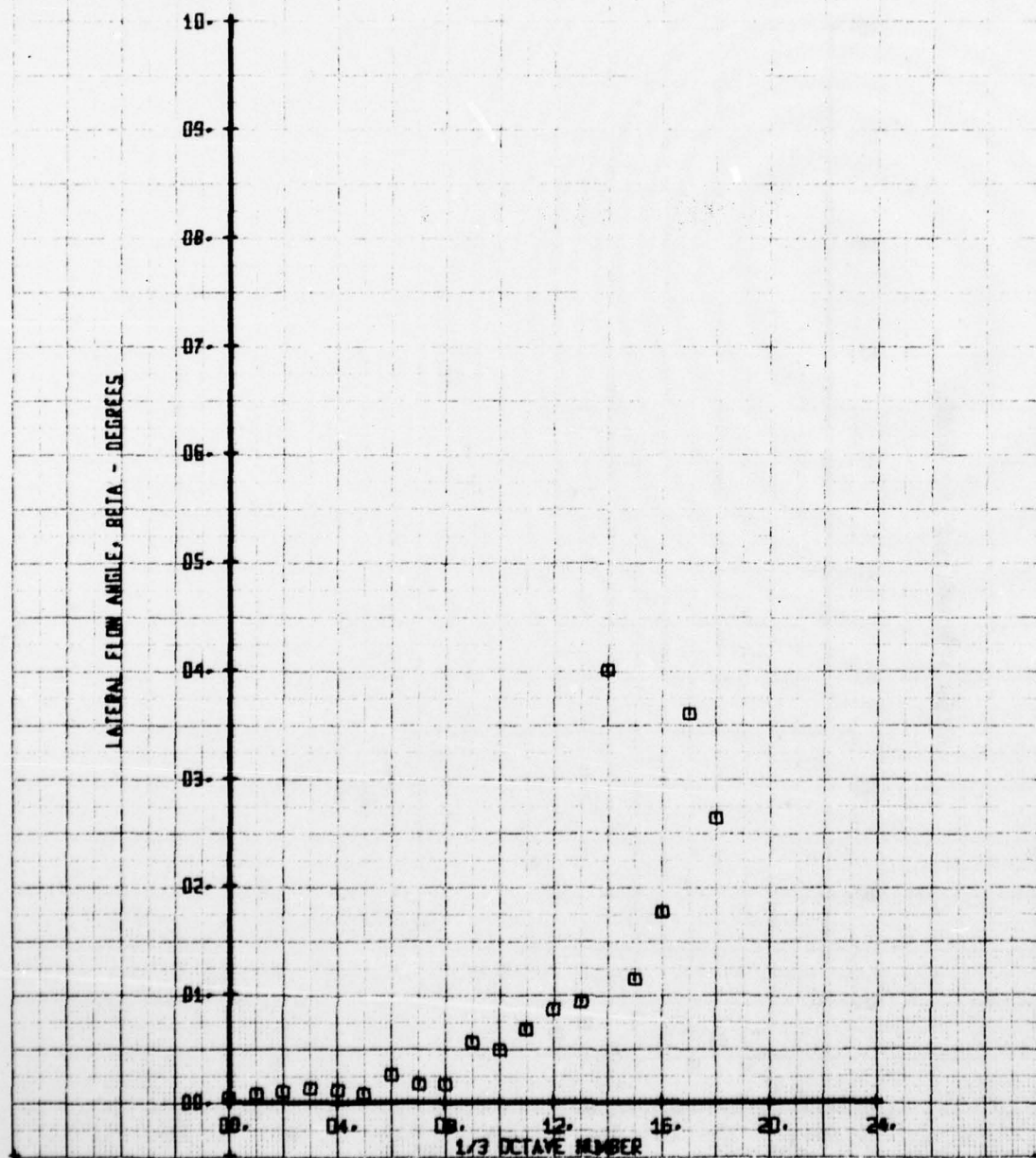
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECTOR+10.4D 2-DGP W/C SHROUD
 RUN 177 TP 4

SYM	CH	LEGEND
□	65	PARAMETER BETA



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECTOR-10-40- 2-06P W/C SHROUD
 RUN 177 TP 5

LEGEND	
SYM	CH
□	6S
	PARAMETER
	BETA

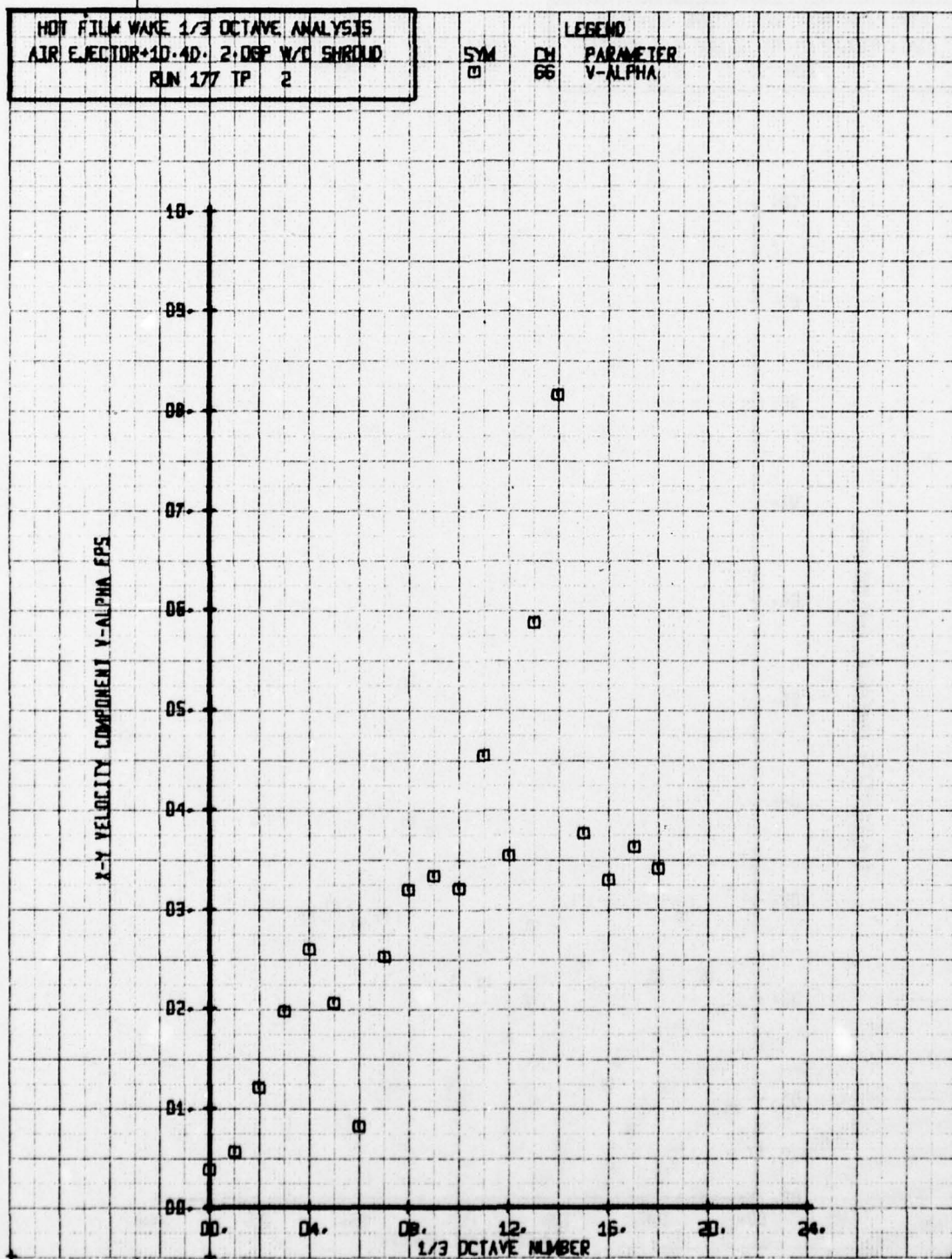


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECTOR-10-40- 2:06P W/O SHROUD
 RUN 177 TP 2

SYM
 □

CH
 66

LEGEND
 PARAMETER
 V-ALPHA



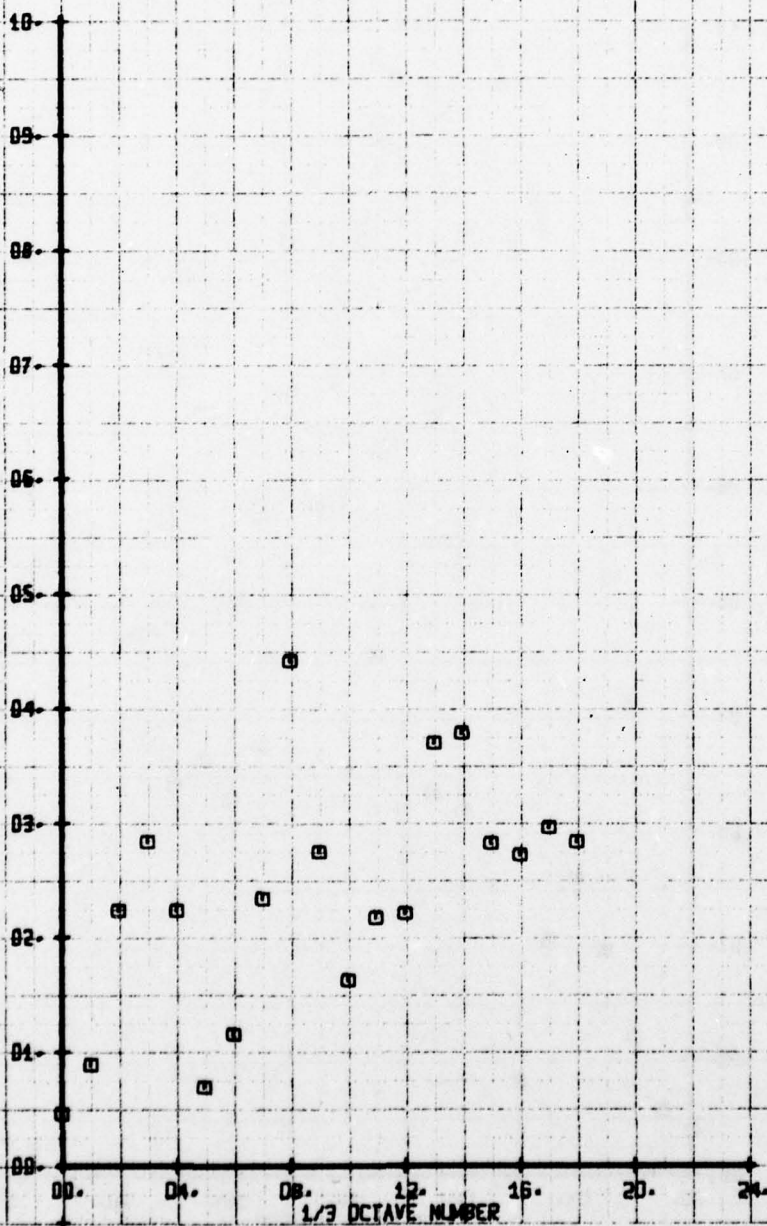
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECTOR-10-40- 2-DEP V/C SHROUD
 RUN 177 TP 3

SYM
 □

CH
 66

LEGEND
 PARAMETER
 V-ALPHA

X-Y VELOCITY COMPONENT V-ALPHA FPS



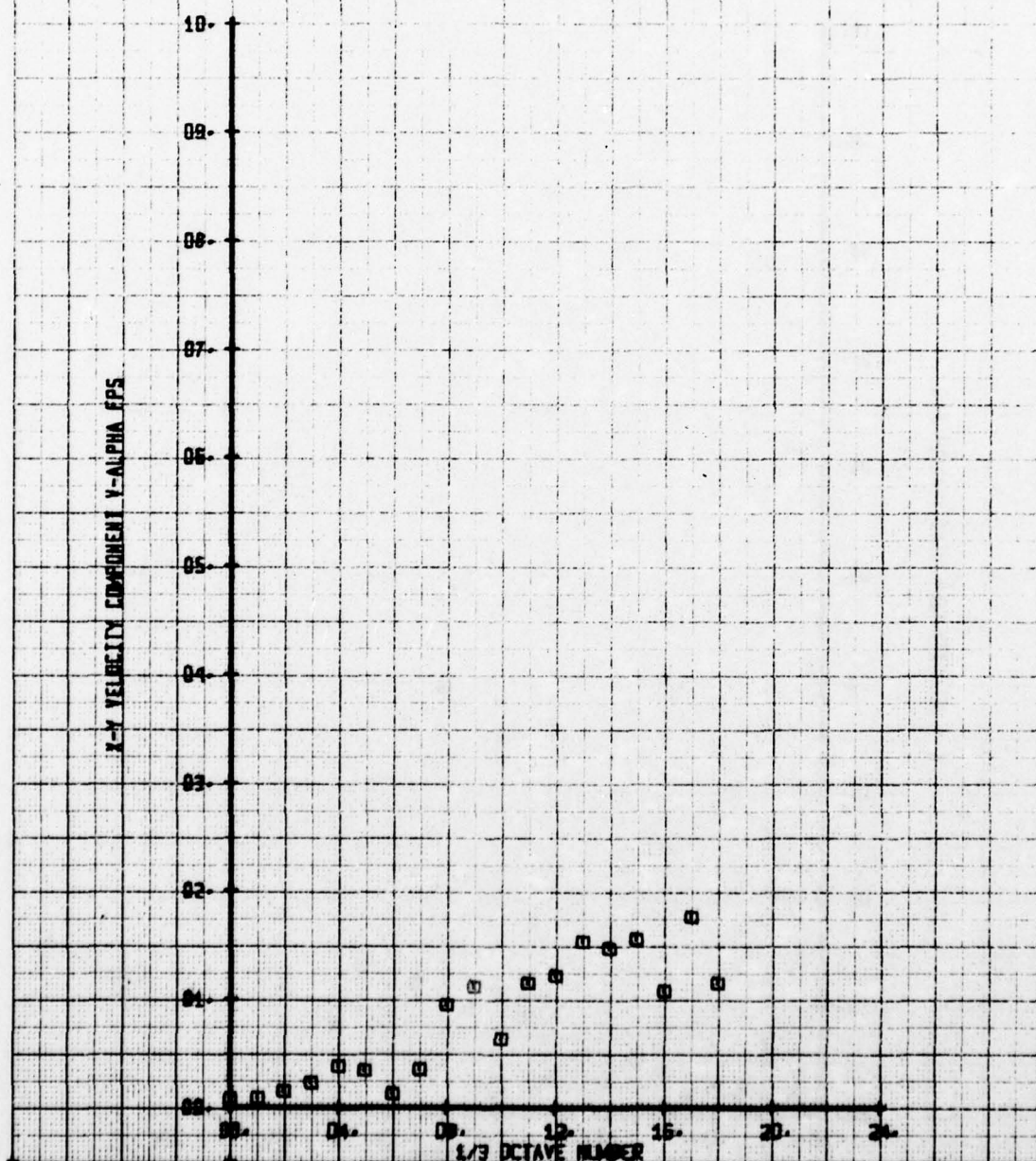
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECTOR-10-40- 2-DGP W/C SHROUD
 RUN 177 TP 4

SYM
 □

CH
 66

LEGEND
 PARAMETER
 V-ALPHA

X-Y VELOCITY COMPONENT V-ALPHA FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECTOR-10-40- 2-DEP W/C SHROUD
 RUN 177 TP 5

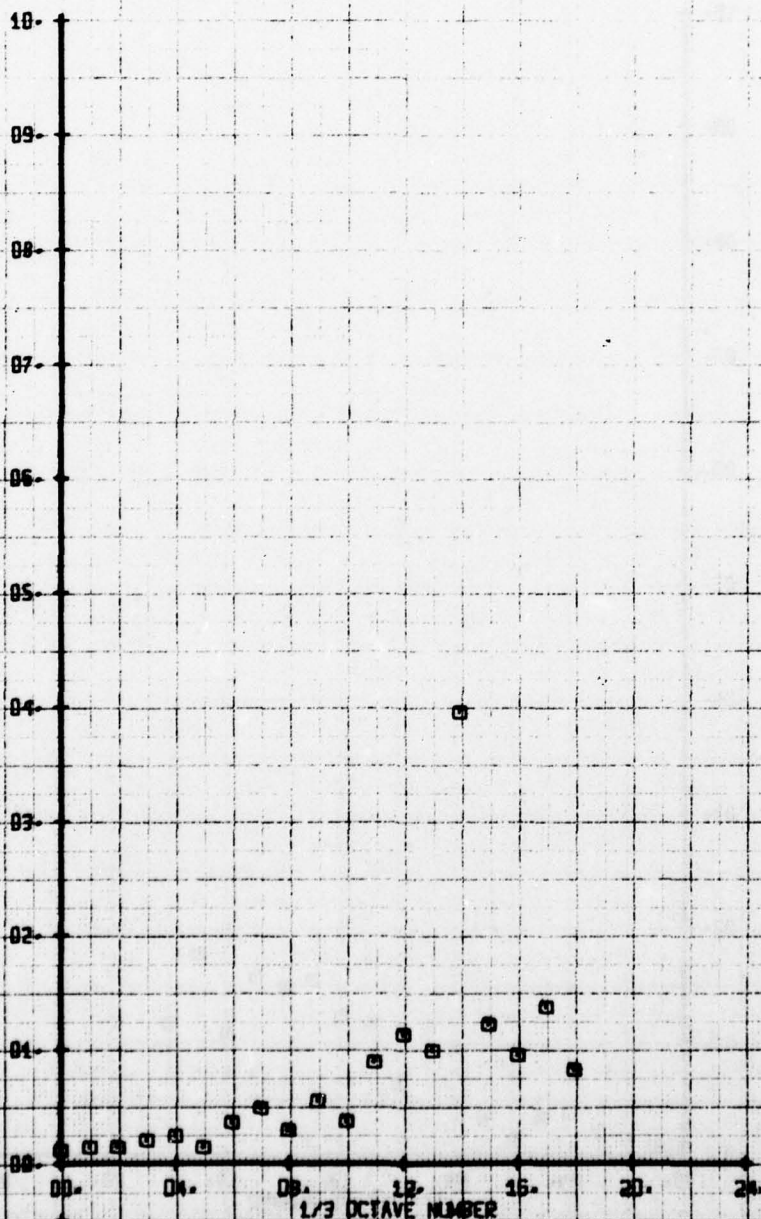
SYM
 □

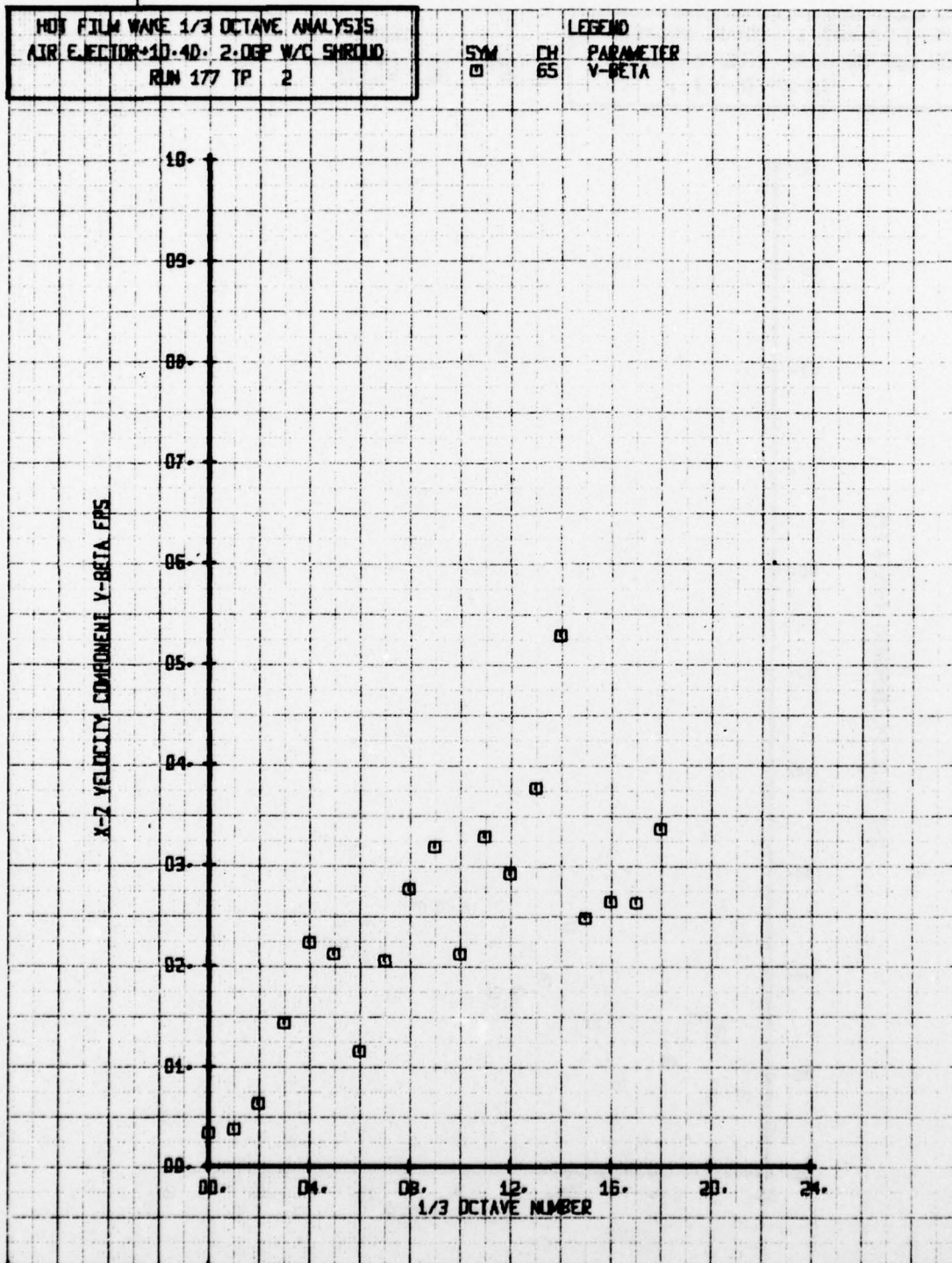
CH
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LEGEND

PARAMETER
 V-ALPHA

X-M VELOCITY COMPONENT V-ALPHA FPS

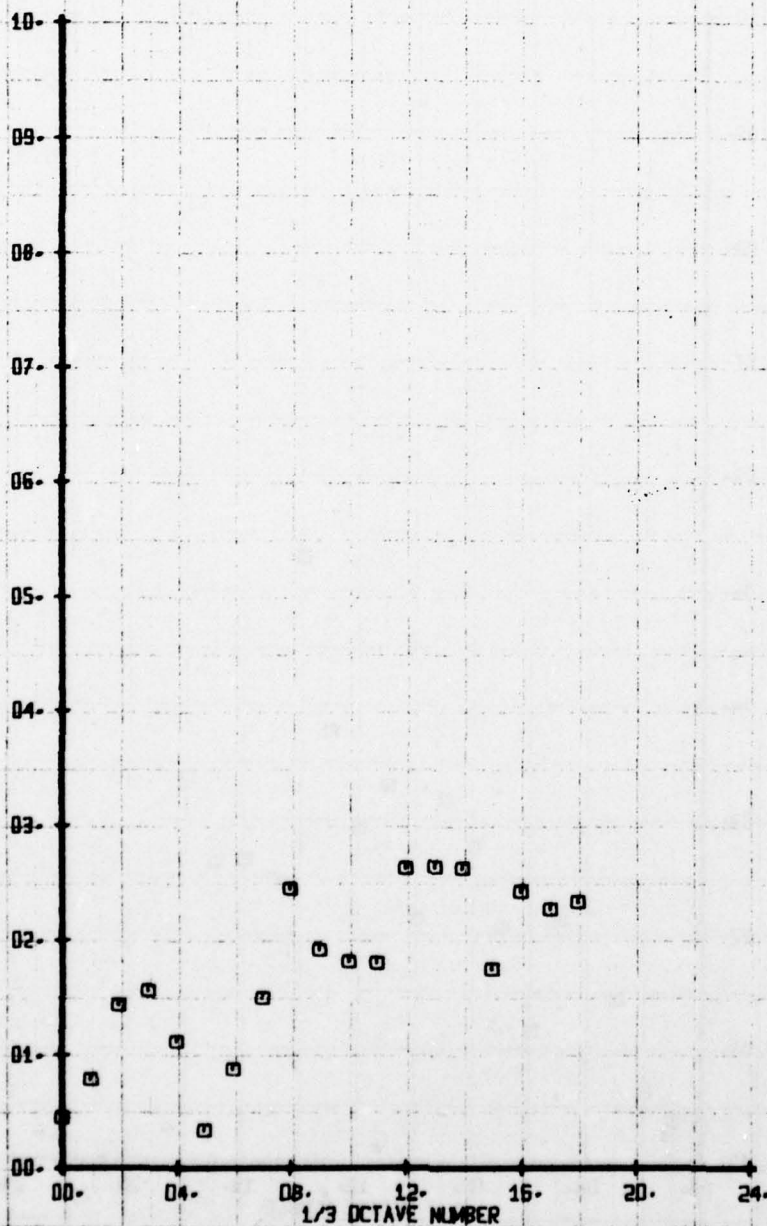




HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECTOR-10-40- 2-DGP W/C SHROUD
 RUN 177 TP 3

SYM CH
 0 65
 LEGEND
 PARAMETER
 V-BETA

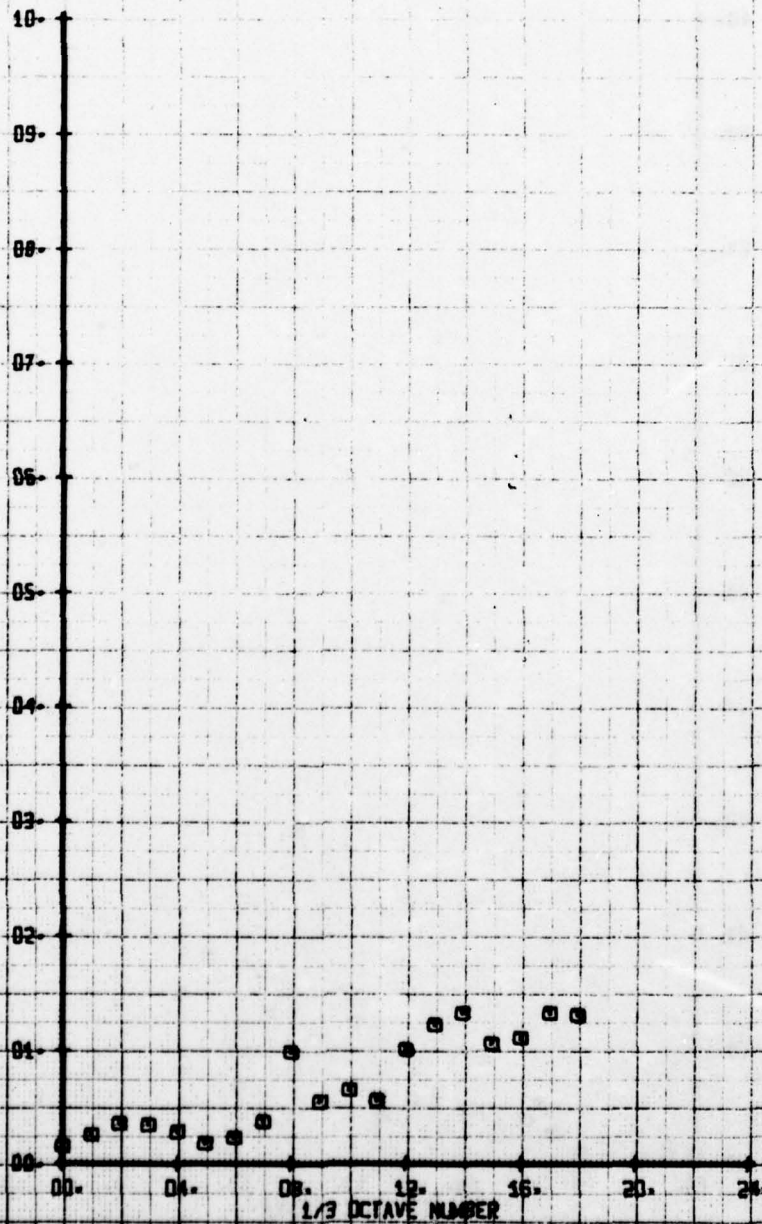
X-Z VELOCITY COMPONENT V-BETA FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 AIR EJECTOR-10-40- 2-OGP W/C SHROUD
 RUN 177 TP 4

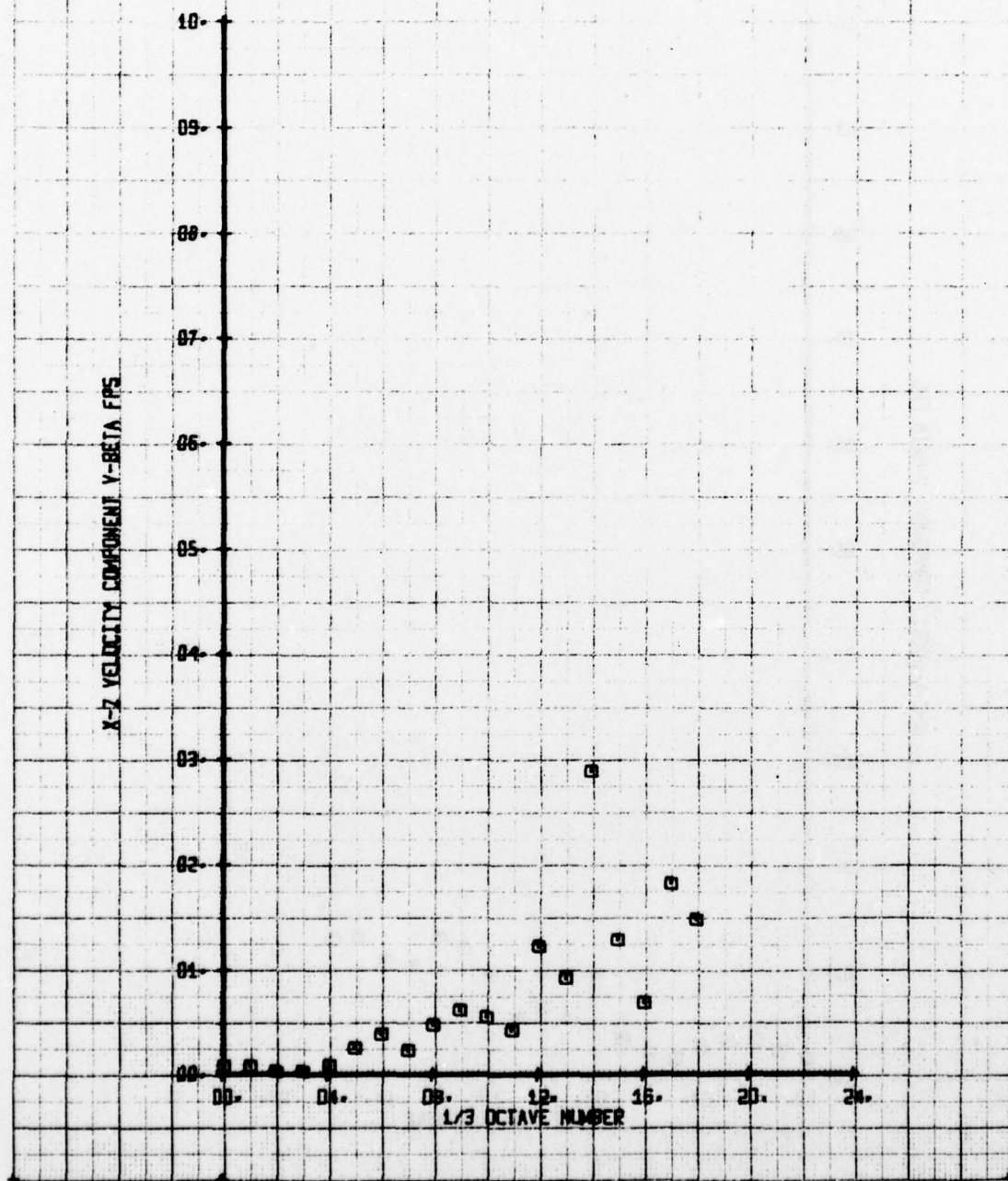
LEGEND
 SYM CH PARAMETER
 □ 65 V-BETA

X-2 VELOCITY COMPONENT V-BETA FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
AIR EJECTOR-10-40- 2-DEP V/C SHROUD
RUN 177 TP 5

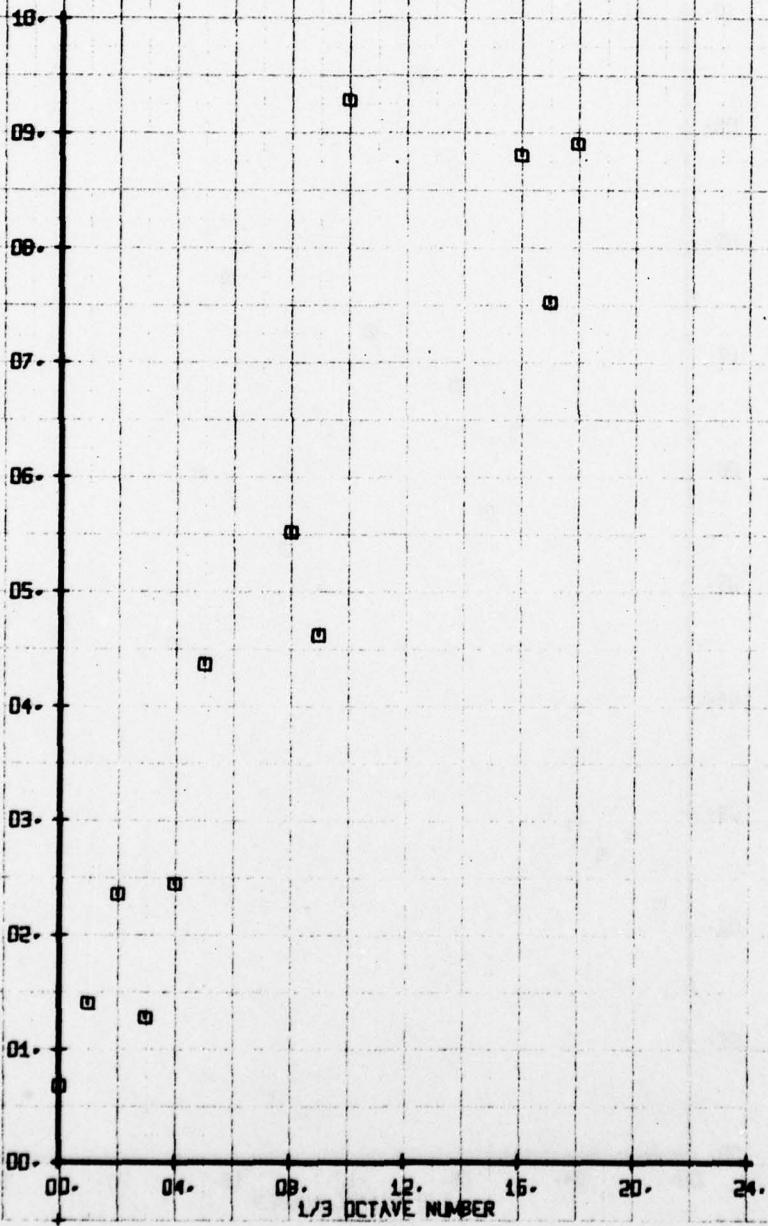
SYM	CH	PARAMETER
□	65	V-BETA



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 NACELLE MOUNTED STUB WING
 RUN 179 TP 2

SYM CH PARAMETER
 □ 66 ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES



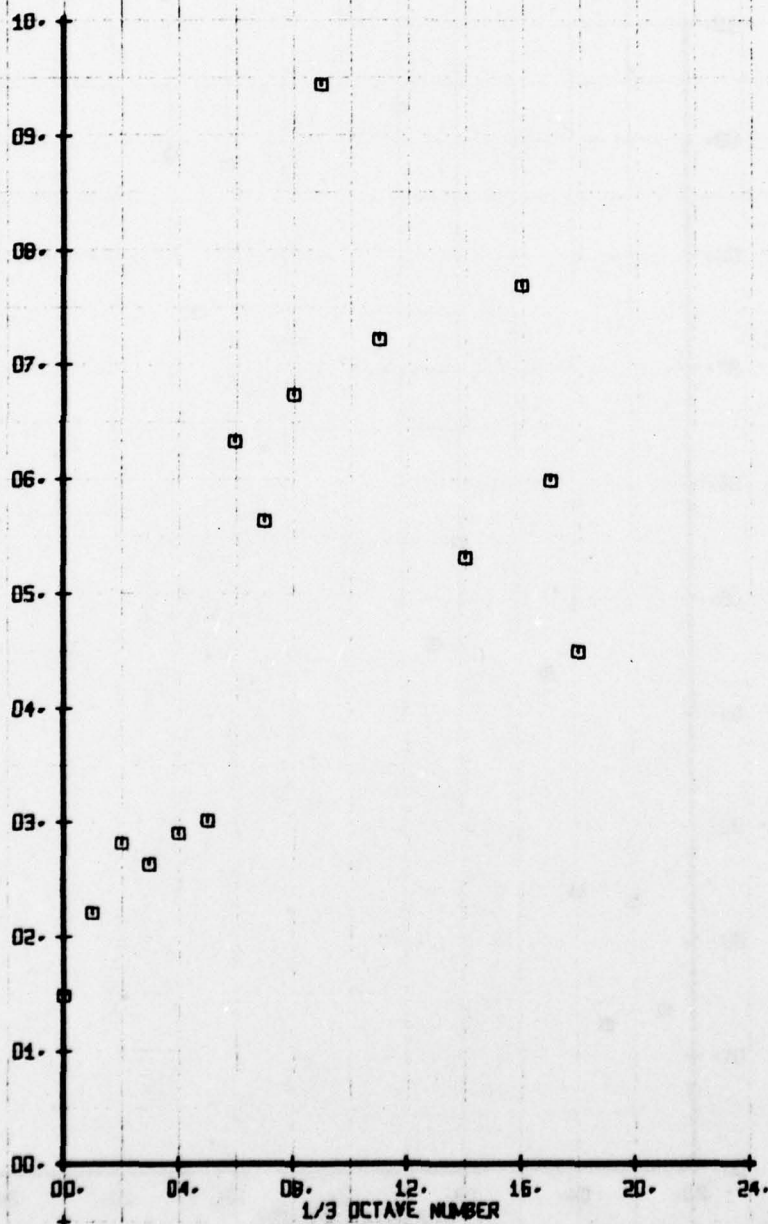
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
NACELLE MOUNTED STUB WING
RUN 17B TP 3

SYM
□

CH
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LEGEND
PARAMETER
ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES



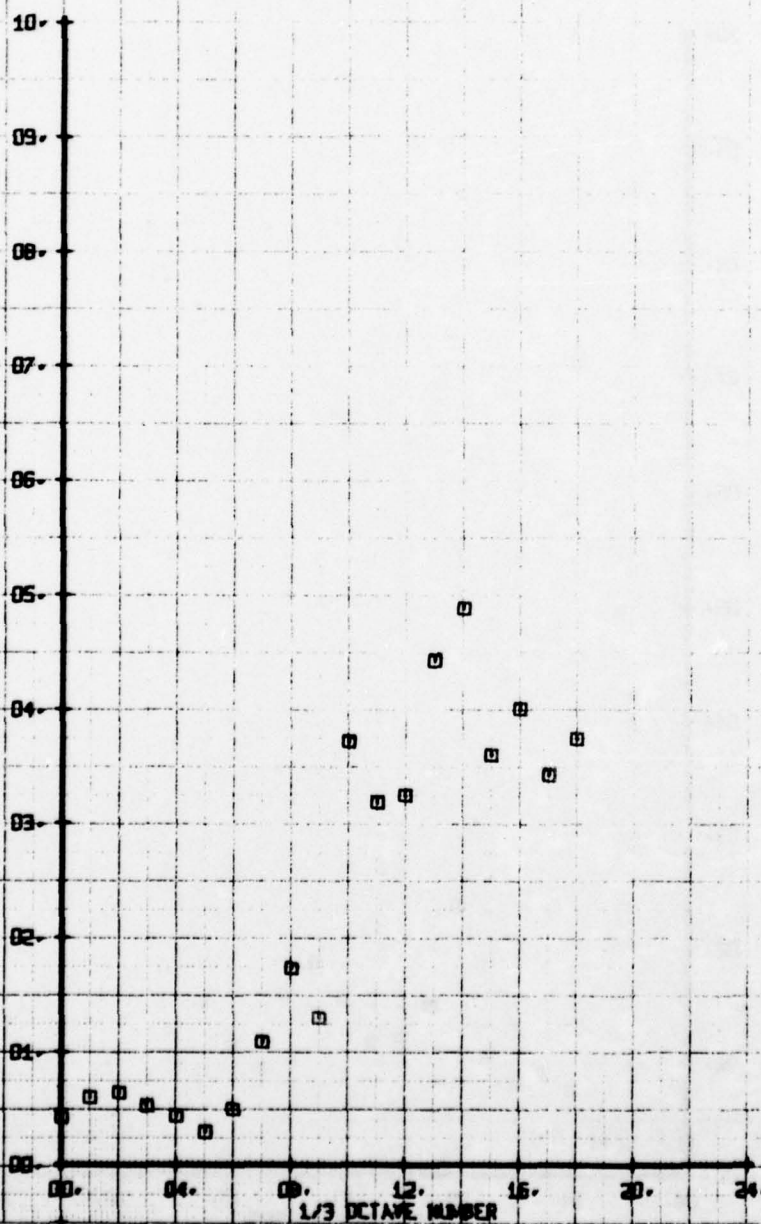
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 NACELLE MOUNTED STUB WING
 RUN 17B TP 4

SYM
 □

CH
 66

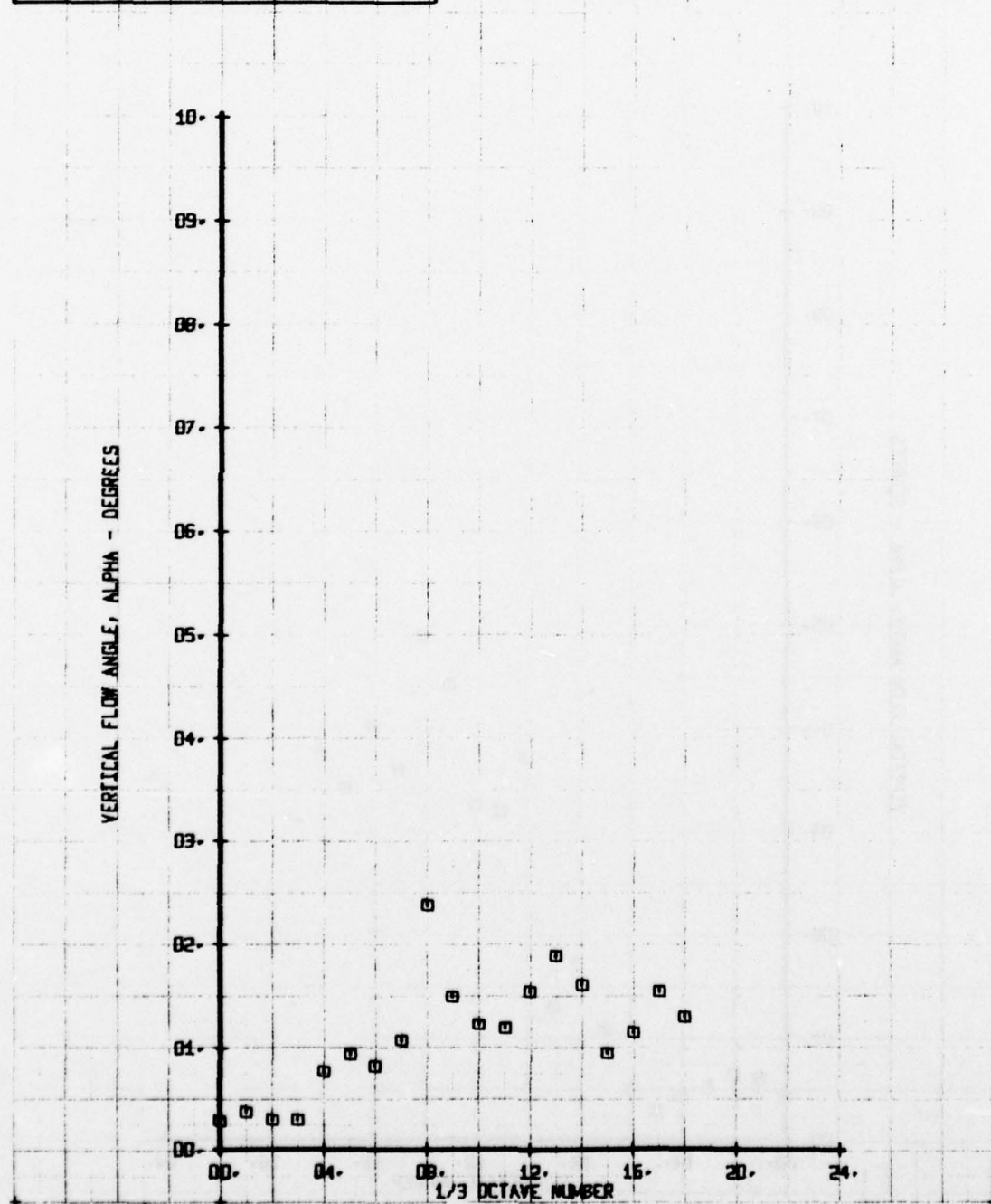
LEGEND
 PARAMETER
 ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
NACELLE MOUNTED STUB WING
RUN 179 TP 5

LEGEND
SYM CH PARAMETER
□ 66 ALPHA



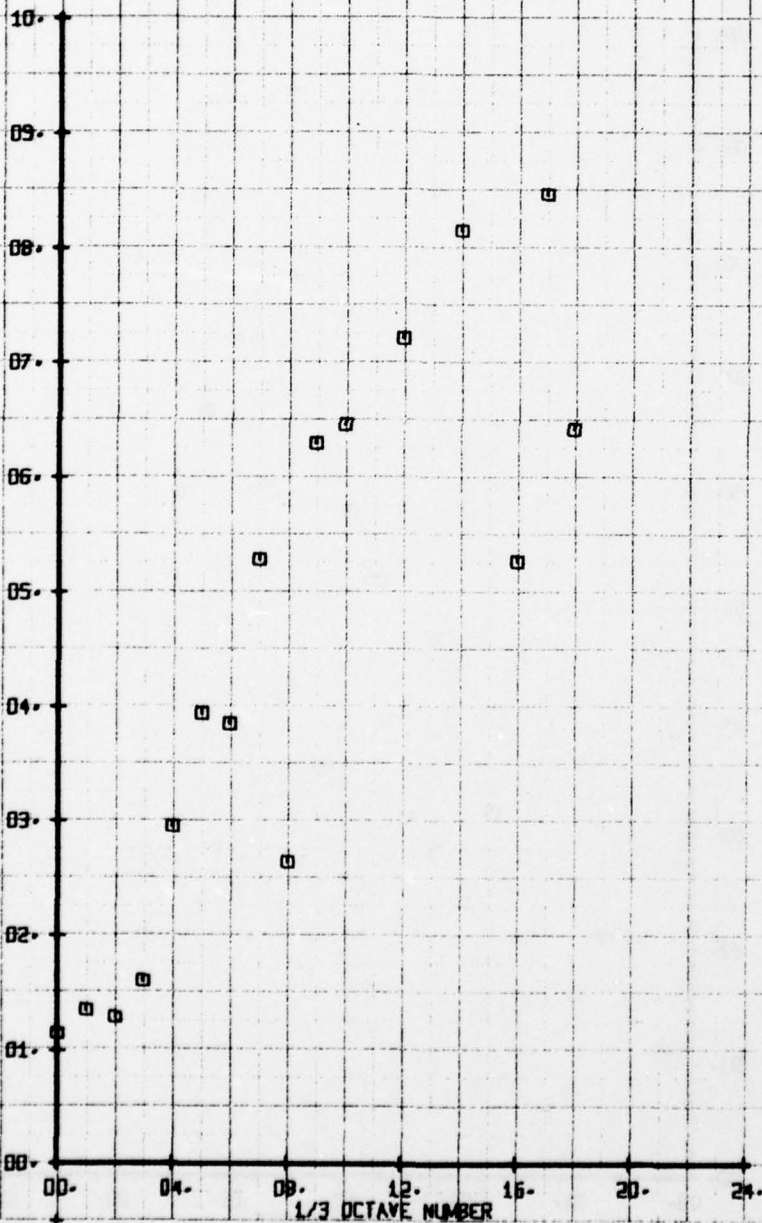
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 NACELLE MOUNTED SLUB WING
 RUN 179 TP 2

SYM
 □

CH
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LEGEND
 PARAMETER
 BETA

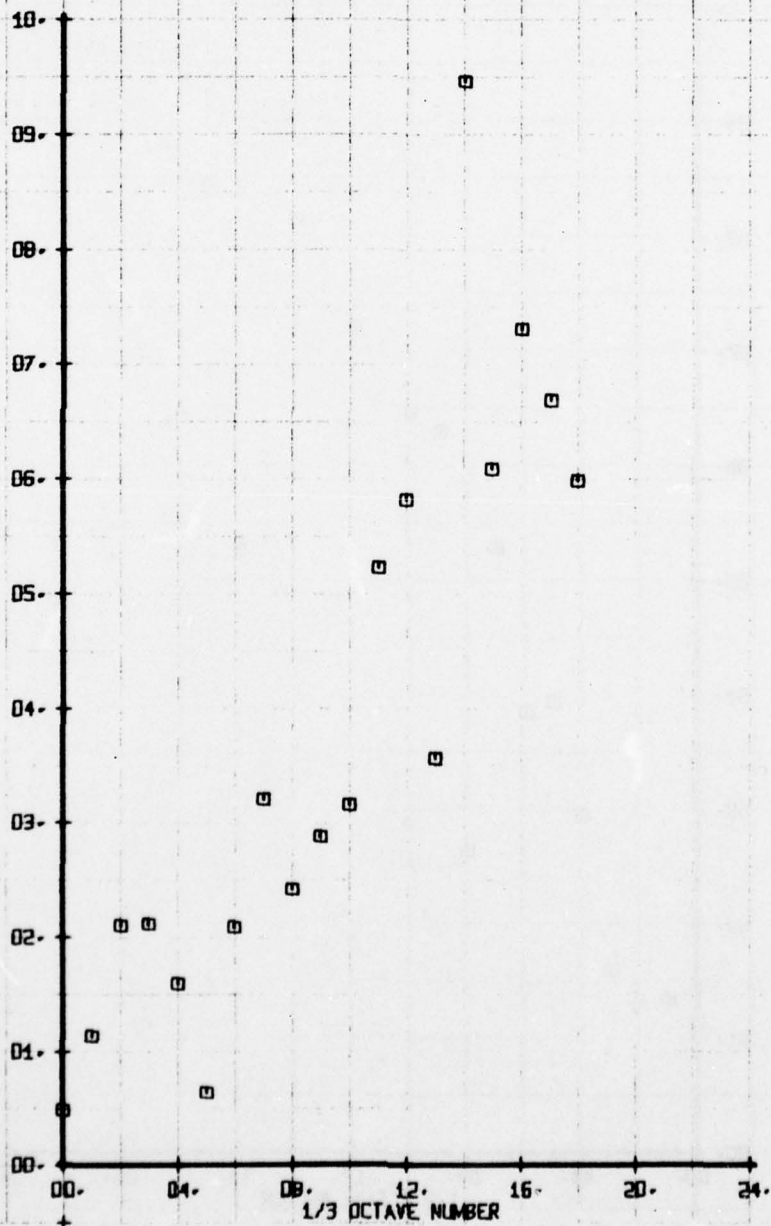
LATERAL FLOW ANGLE, BETA - DEGREES



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 MACELLE MOUNTED STUB WING
 RUN 178 TP 3

SYM	CH	LEGEND
□	65	PARAMETER BETA

LATERAL FLOW ANGLE, BETA - DEGREES



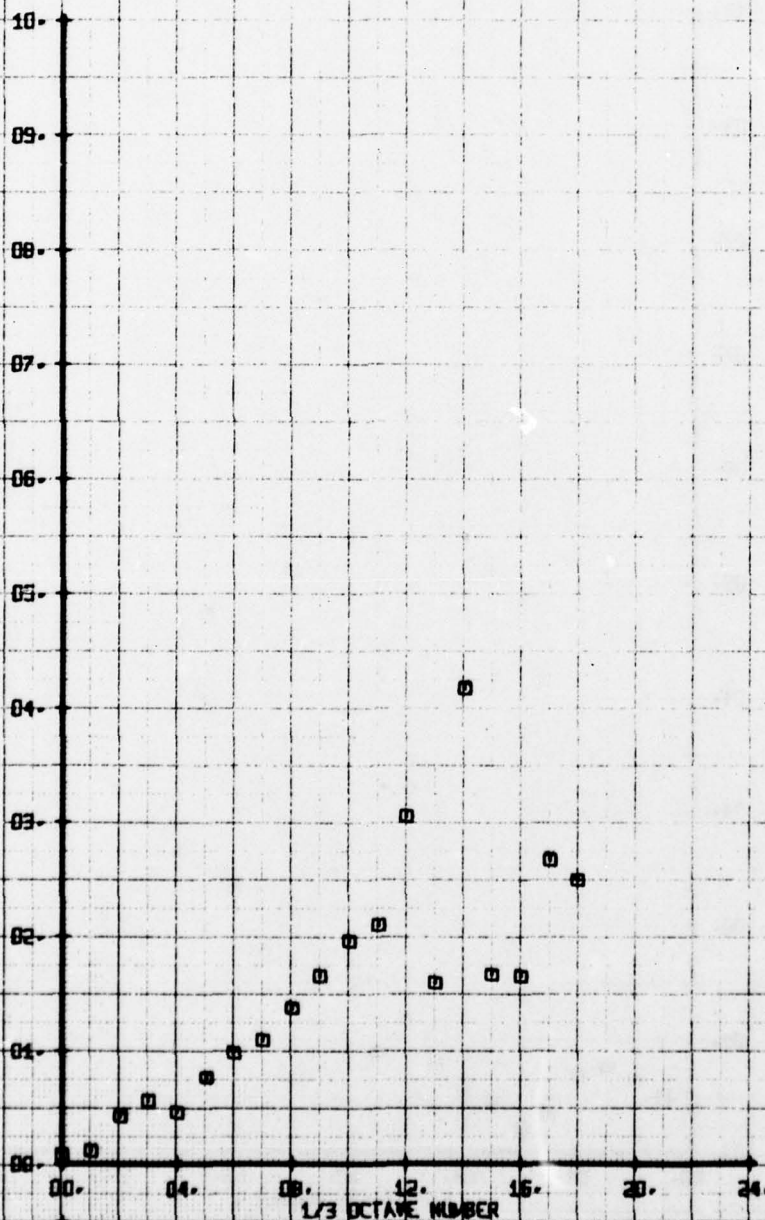
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 NACELLE MOUNTED STUB WING
 RUN 179 TP 4

SYM
 □

CH
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LEGEND
 PARAMETER
 BETA

LATERAL FLOW ANGLE, BETA - DEGREES

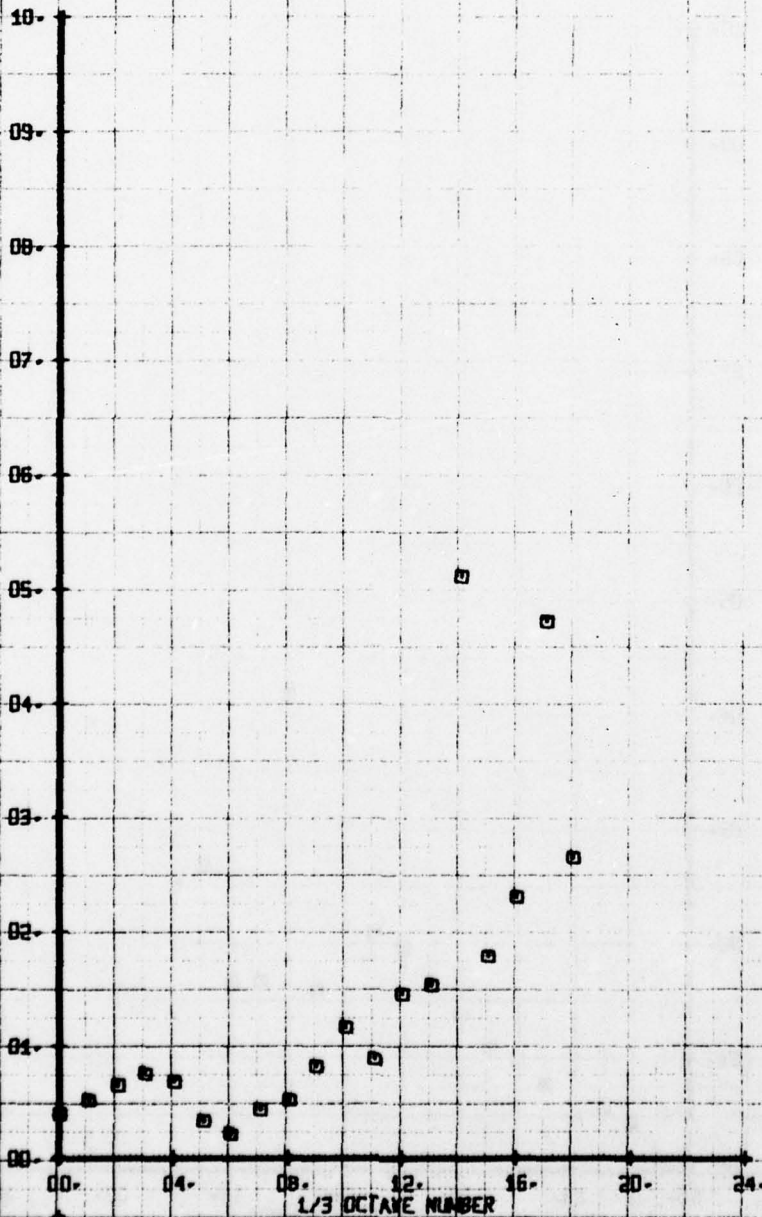


NOT FILM WAKE 1/3 OCTAVE ANALYSIS
 NACELLE MOUNTED STUB WING
 RUN 179 TP 5

SYM
 □

LEGEND
 CH 65
 PARAMETER
 BETA

LATERAL FLOW ANGLE, BETA - DEGREES

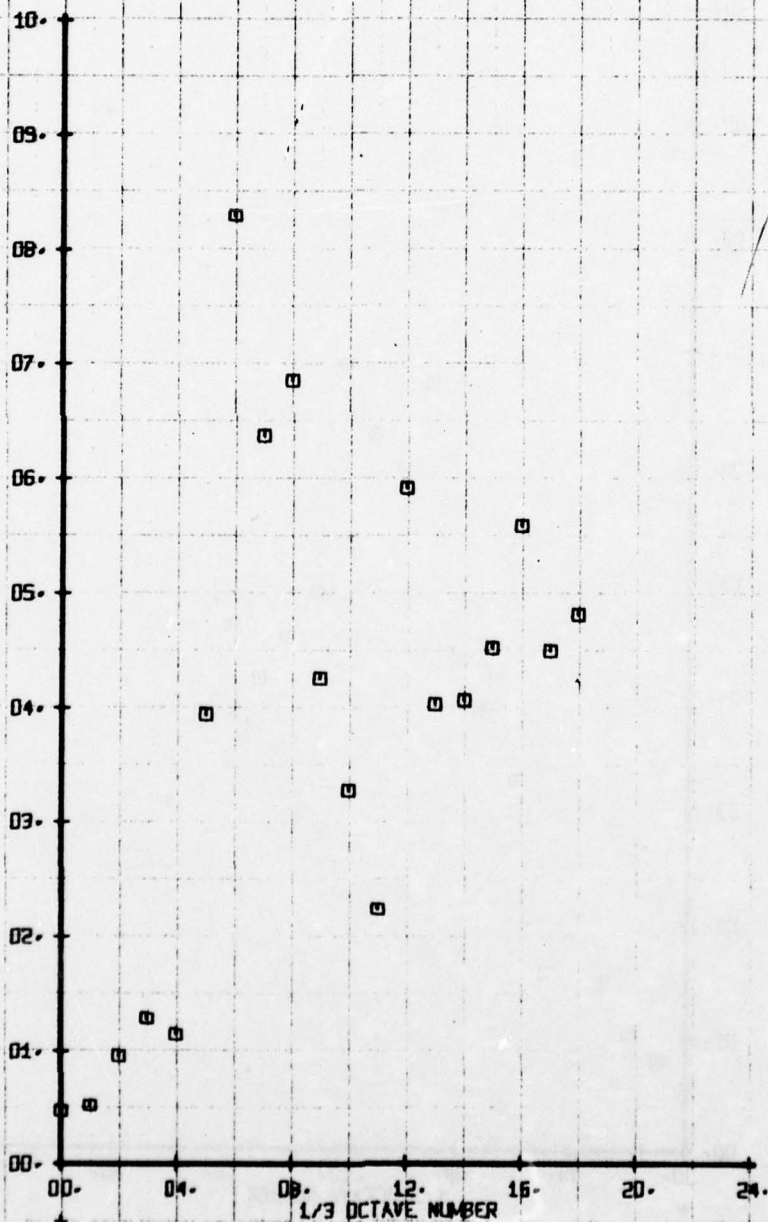


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
NACELLE MOUNTED STUB WING
RUN 17B TP 2

SYM
□

LEGEND
CH 66
PARAMETER
V-ALPHA

X-Y VELOCITY COMPONENT V-ALPHA FPS

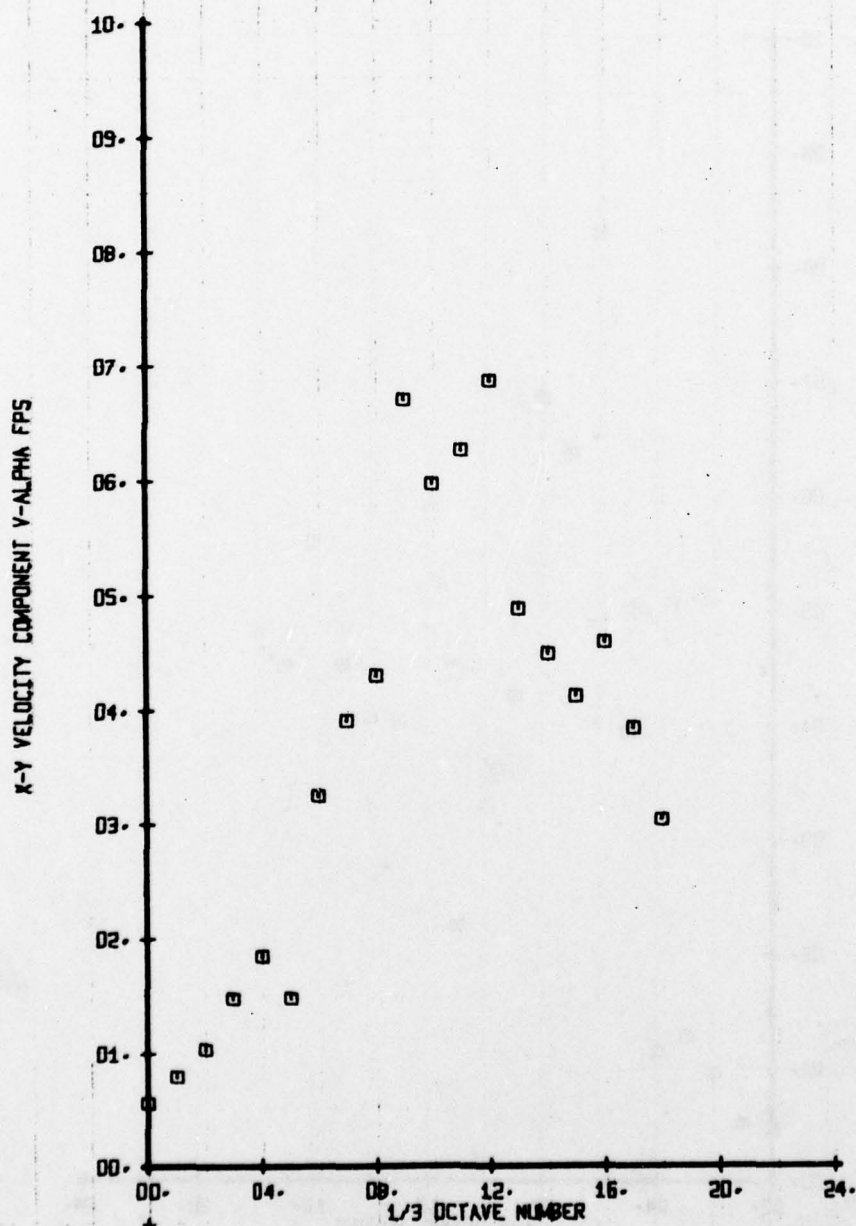


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
NACELLE MOUNTED STUB WING
RUN 17B TP 3

SYM
□

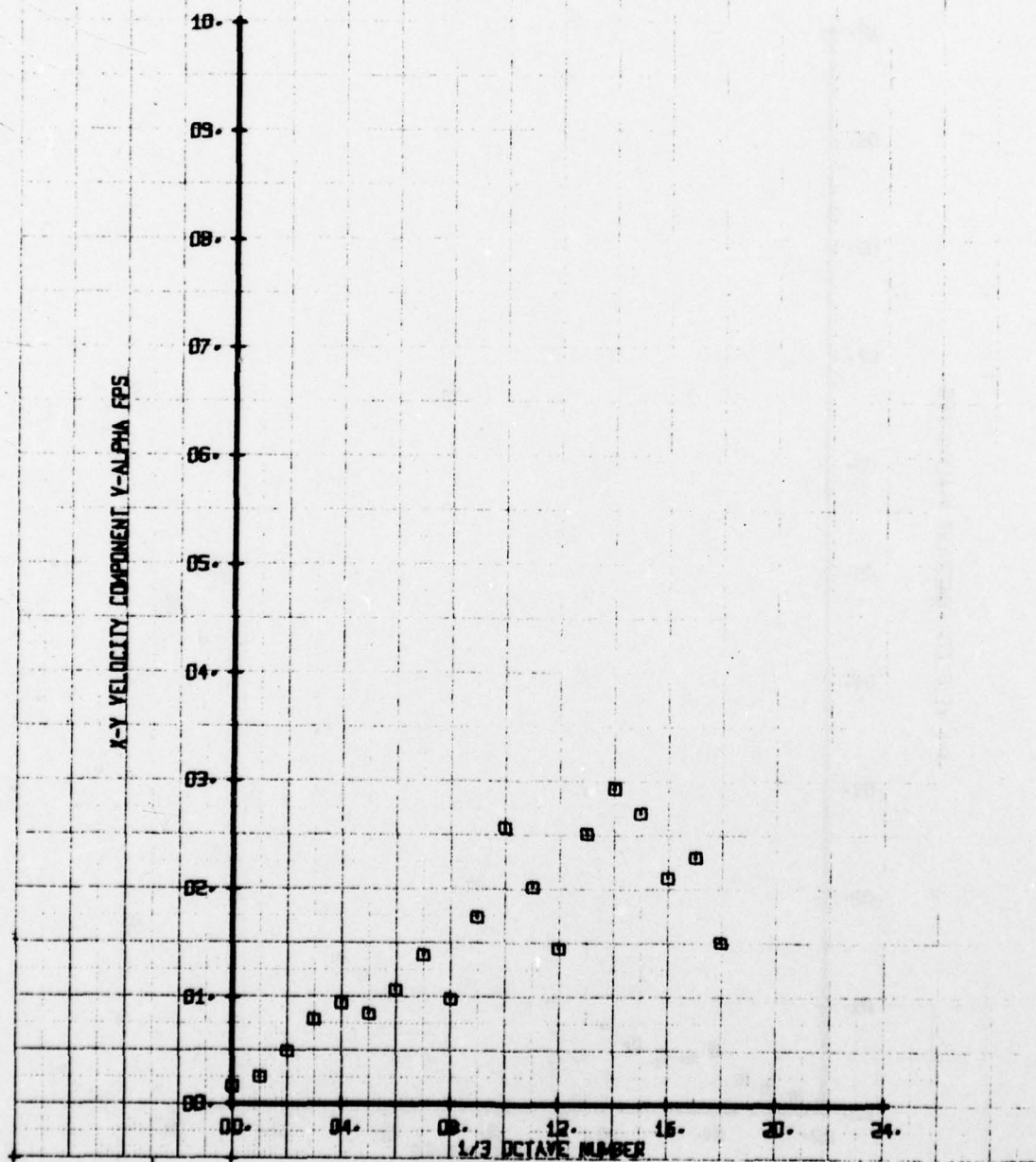
CH
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LEGEND
PARAMETER
V-ALPHA



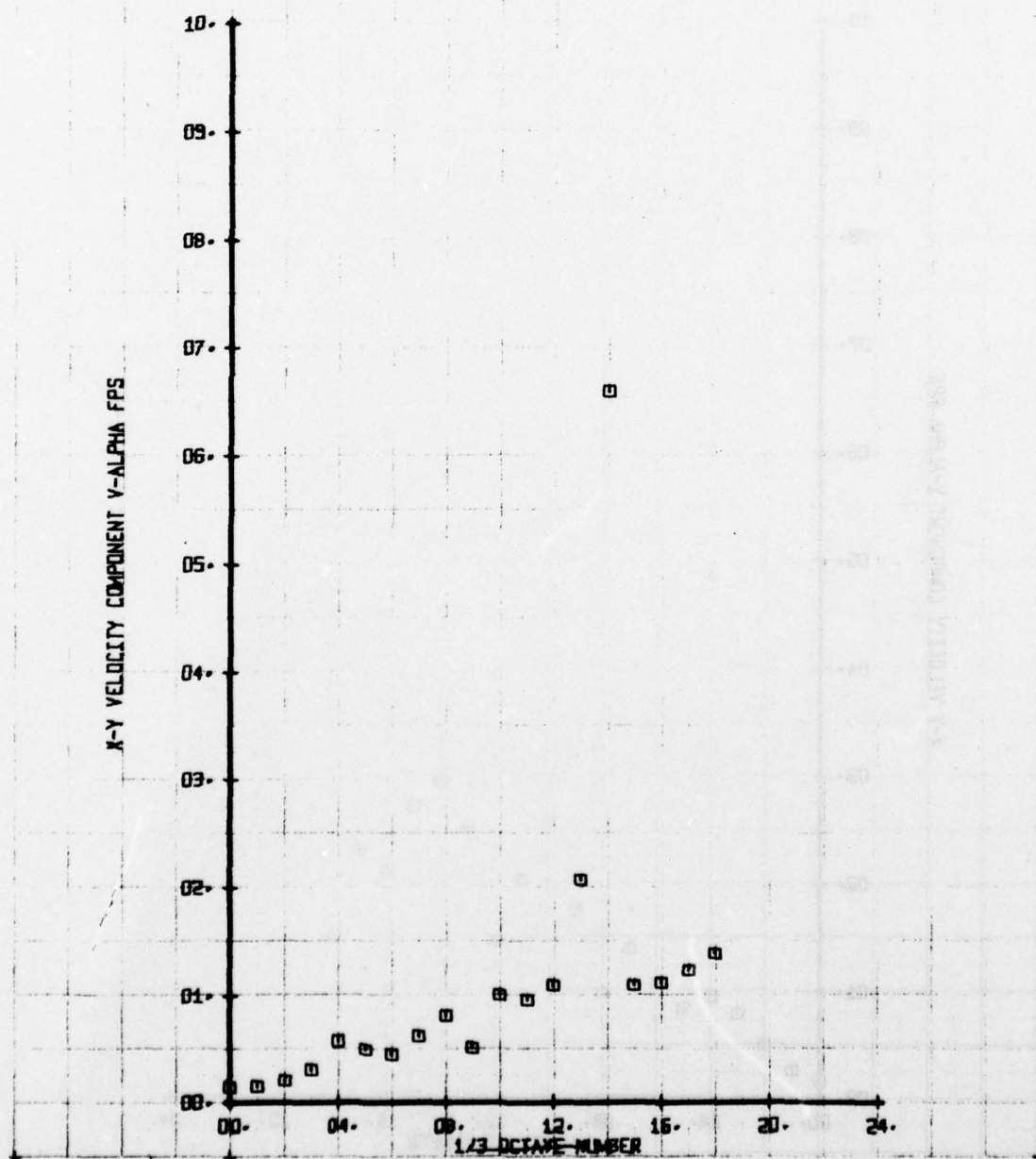
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 NACELLE MOUNTED STUB WING
 RUN 179 TP 4

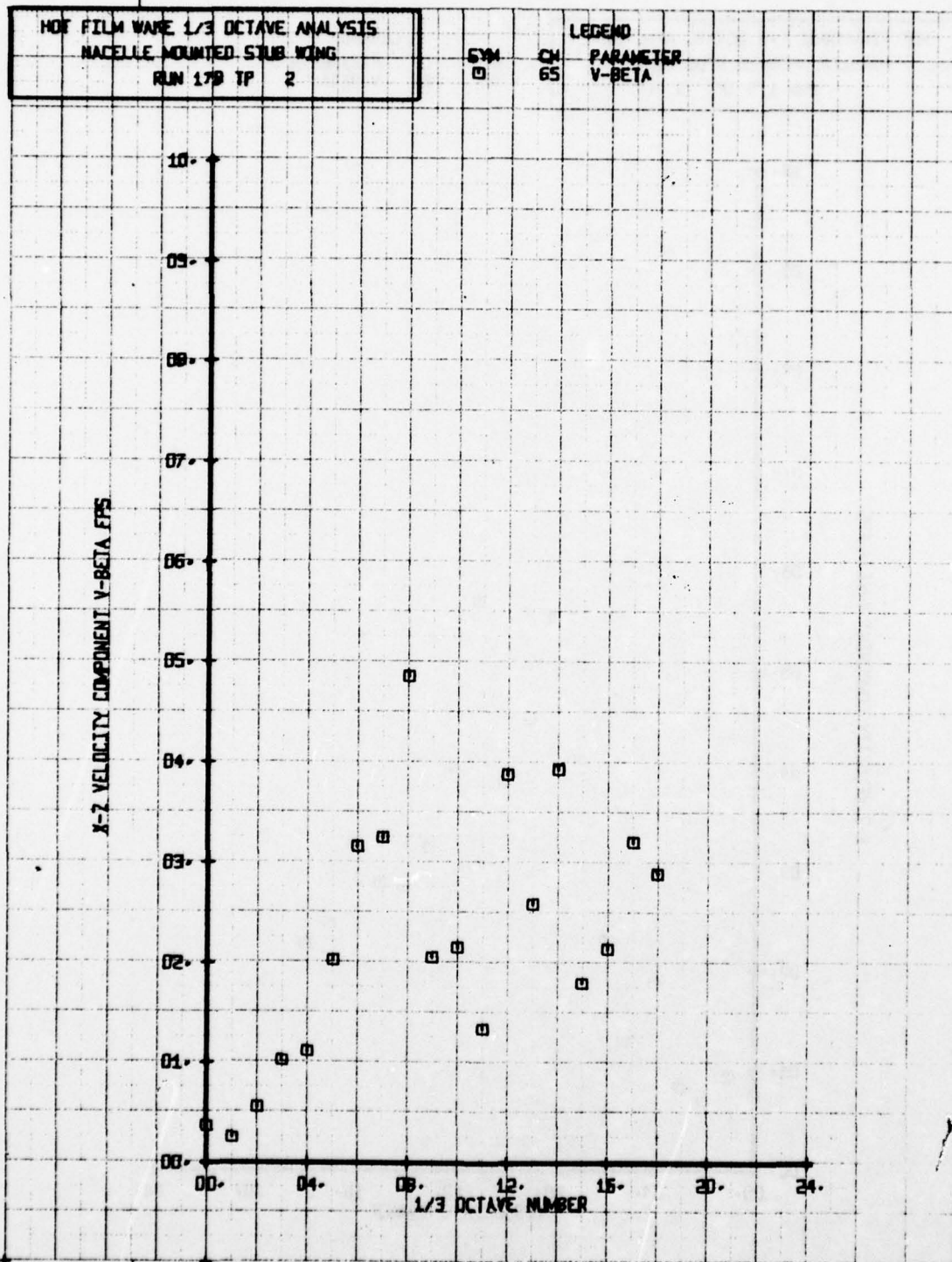
LEGEND
 SYM CH PARAMETER
 □ 66 V-ALPHA



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 NACELLE MOUNTED STUB WING
 RUN 179 TP 5

SYN
 CH 66
 PARAMETER
 V-ALPHA





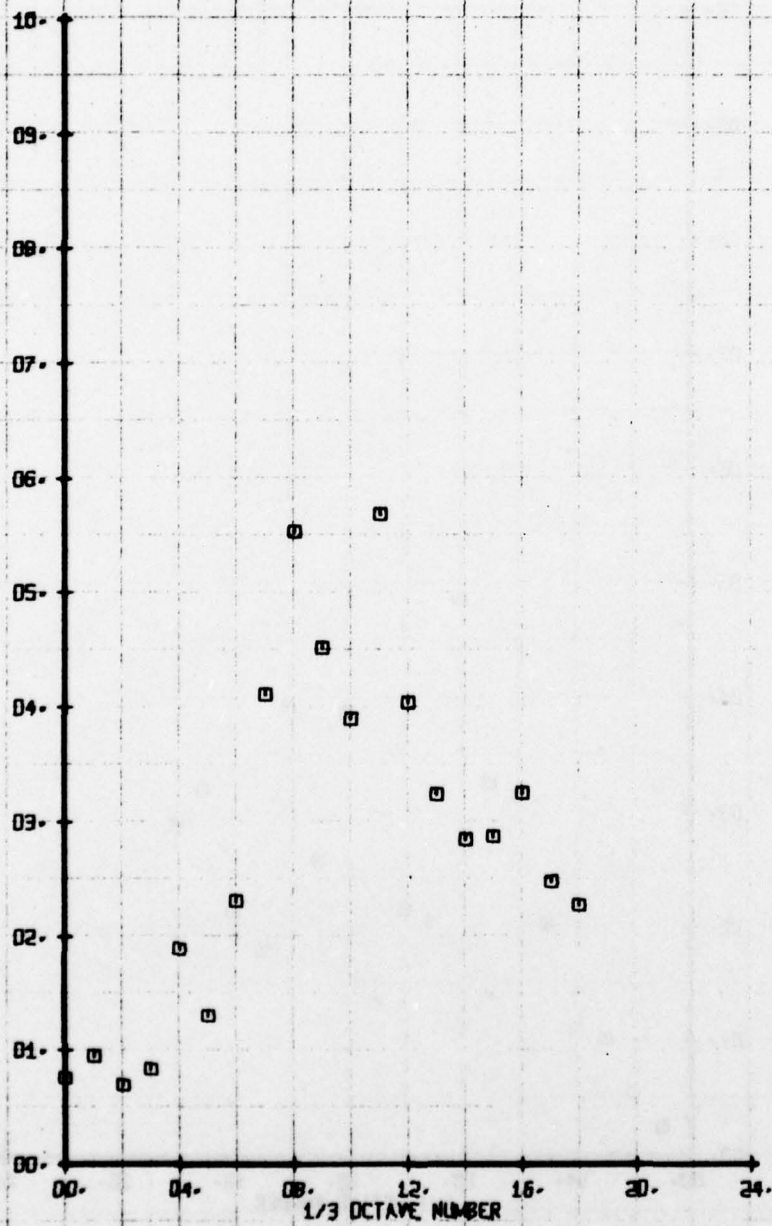
HOT FILM WIRE 1/3 OCTAVE ANALYSIS
 NACELLE MOUNTED STUB WING
 RUN 178 TP 3

SVM
 0

CH
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LEGEND
 PARAMETER
 V-BETA

X-Z VELOCITY COMPONENT V-BETA FPS



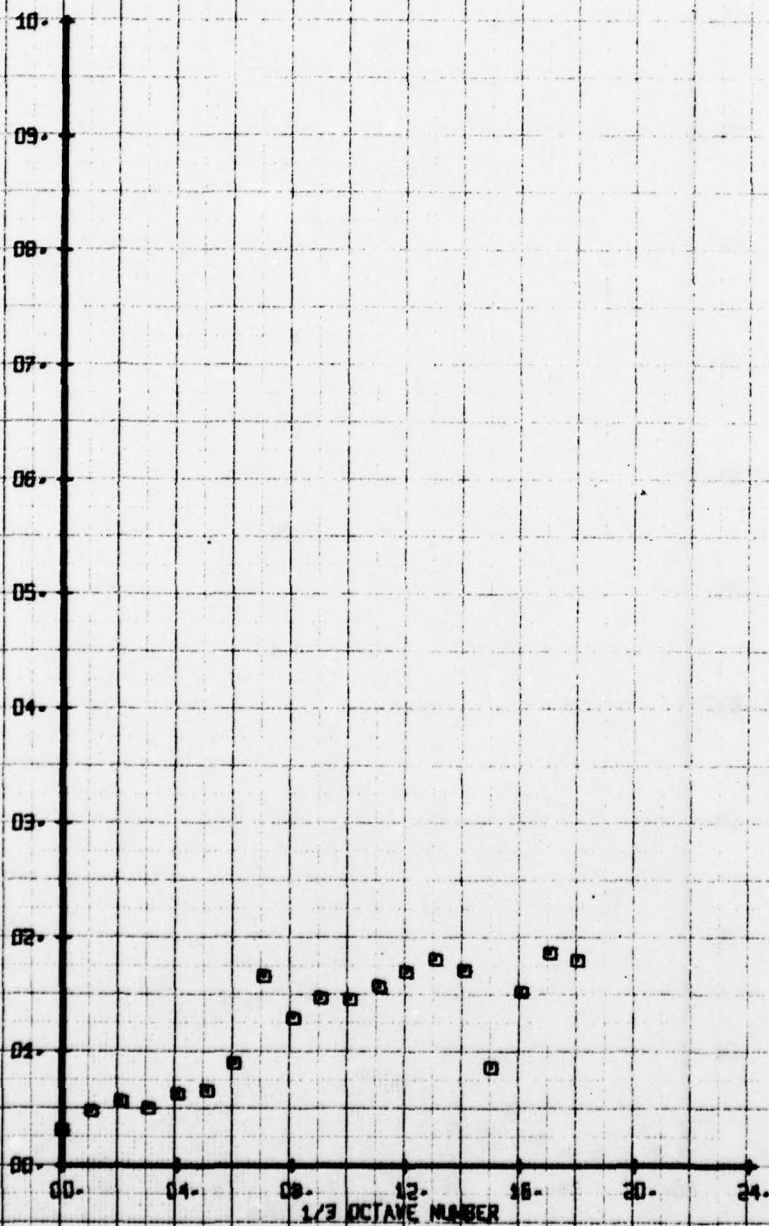
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 NACELLE MOUNTED STUB WING
 RUN 17B TP 4

SYM
 □

CH
 65

LEGEND
 PARAMETER
 V-BETA

X-2 VELOCITY COMPONENT V-BETA FFS



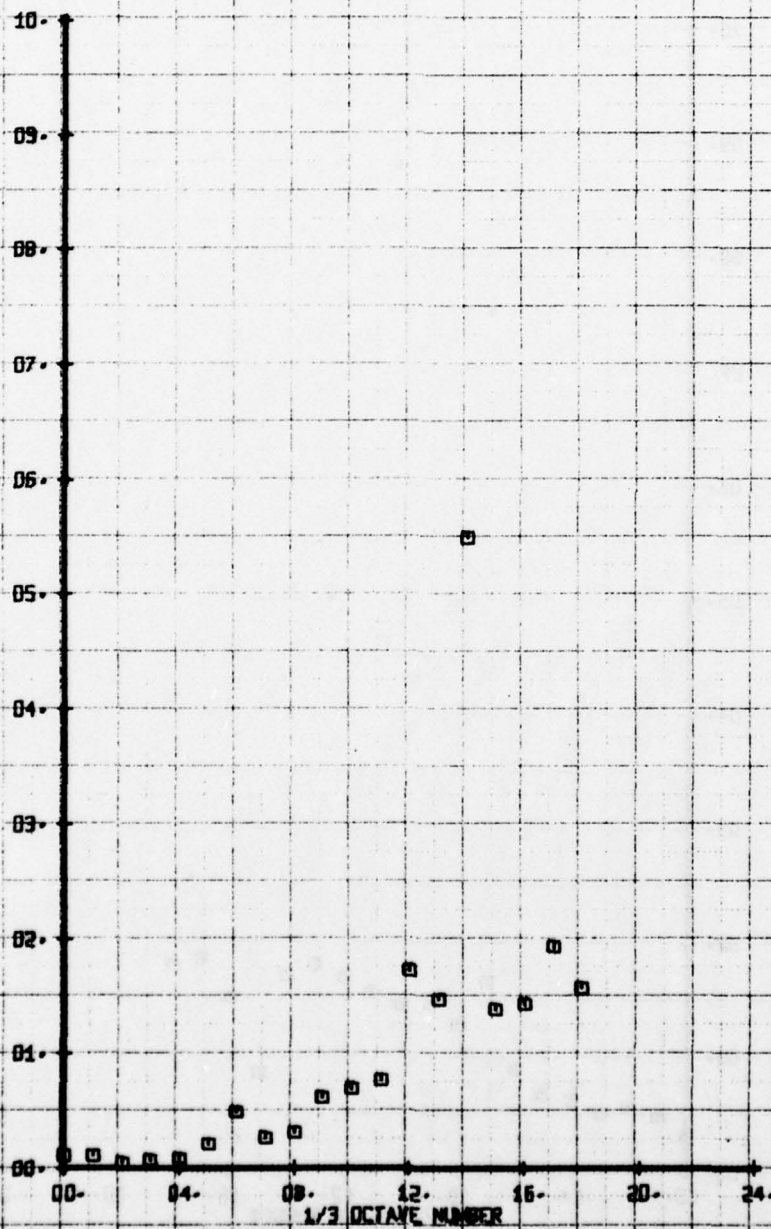
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 NACELLE MOUNTED STUB WING
 RUN 178 TP 5

SYM
 □

CH
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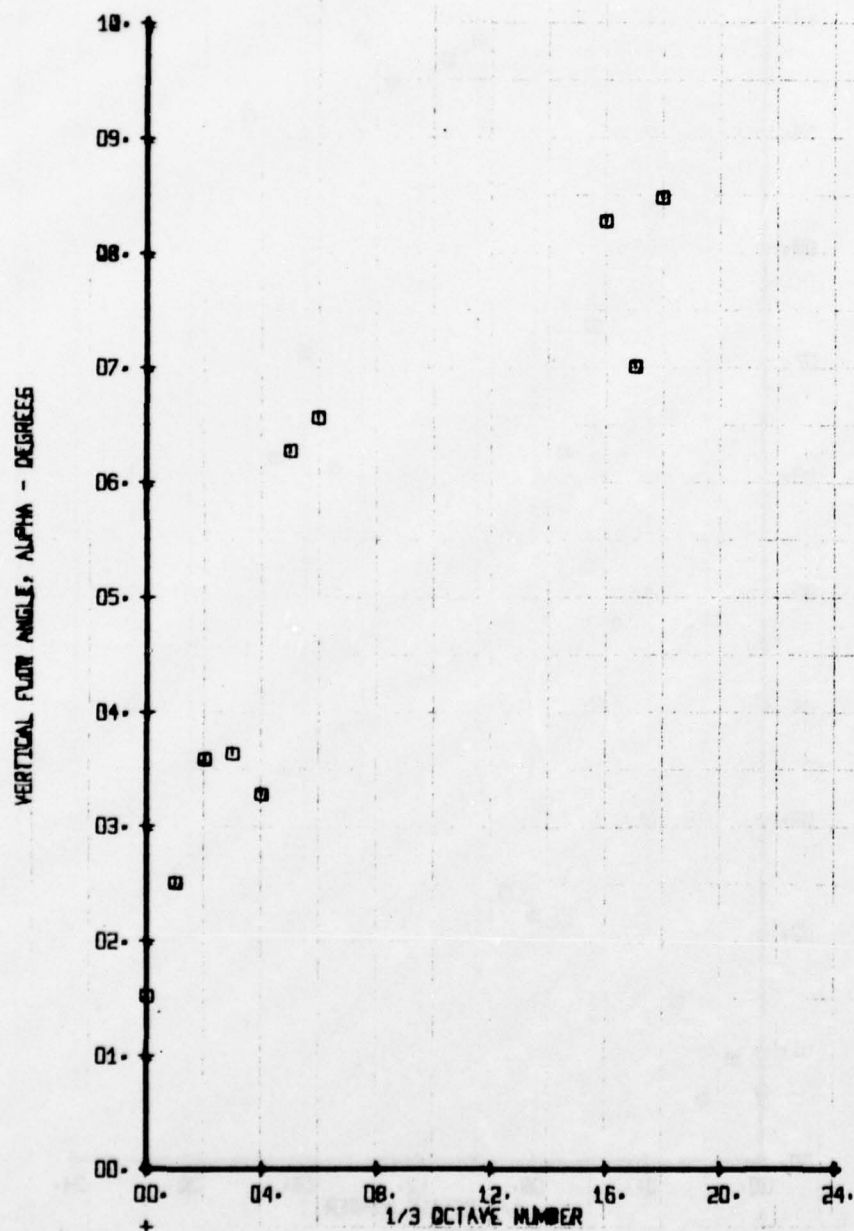
LEGEND
 PARAMETER
 V-BETA

X-2 VELOCITY COMPONENT V-BETA FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
SINGLE SLOTTED FLAPPED WING
RUN 180 TP 2

SYN CH PARAMETER
0 66 ALPHA



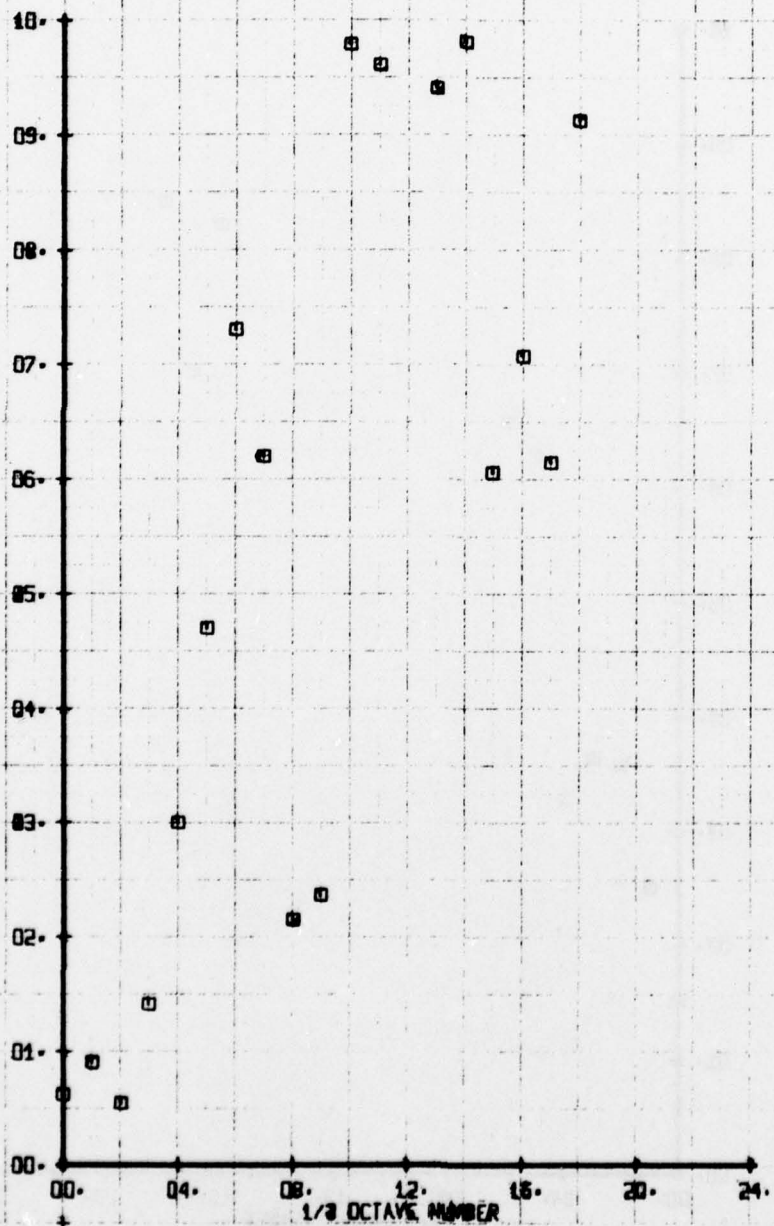
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 SINGLE SLOTTED FLAPPED WING
 RUN 180 TP 3

SYM
 □

DN
 66

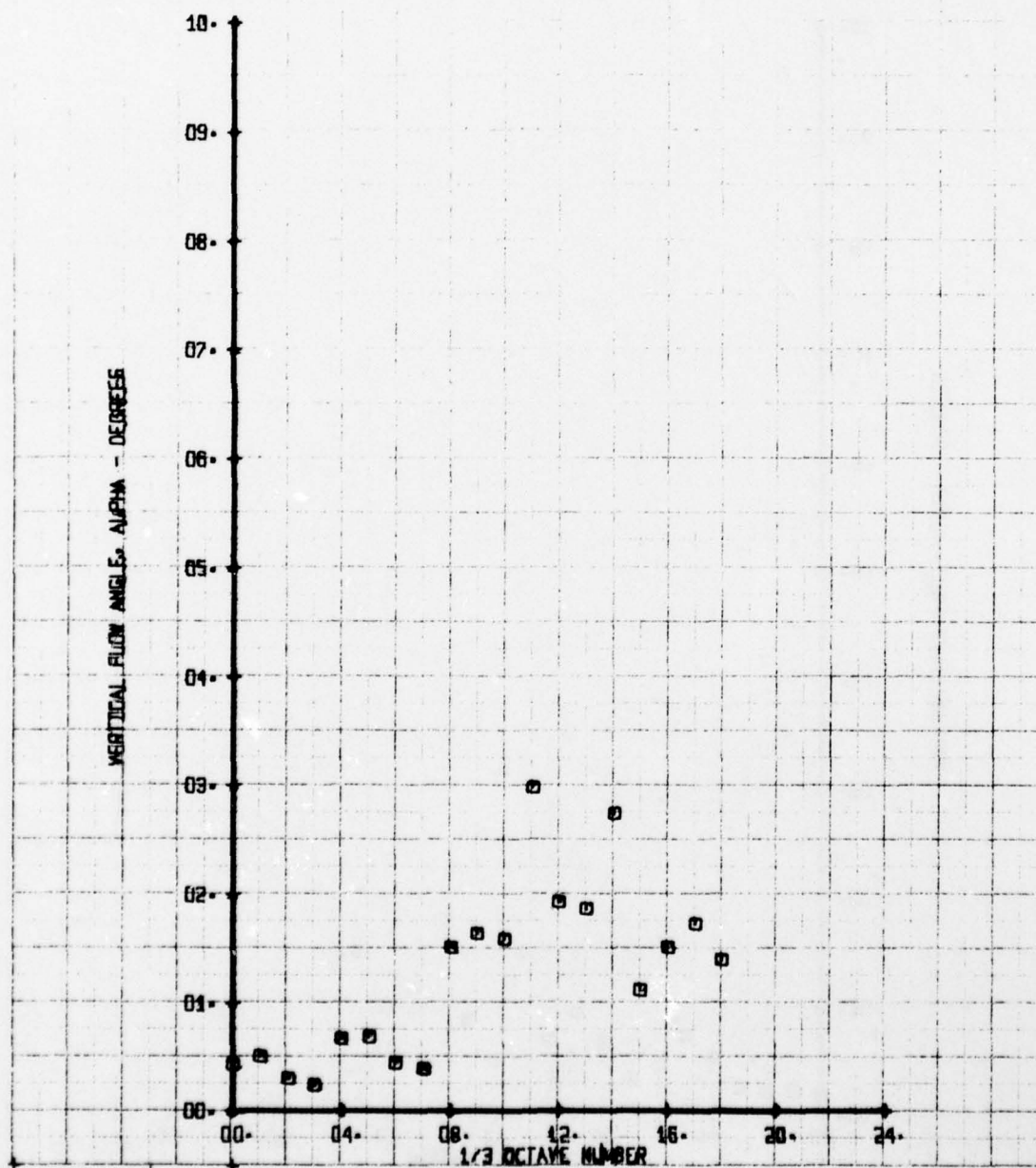
LEGEND
 PARAMETER
 ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES



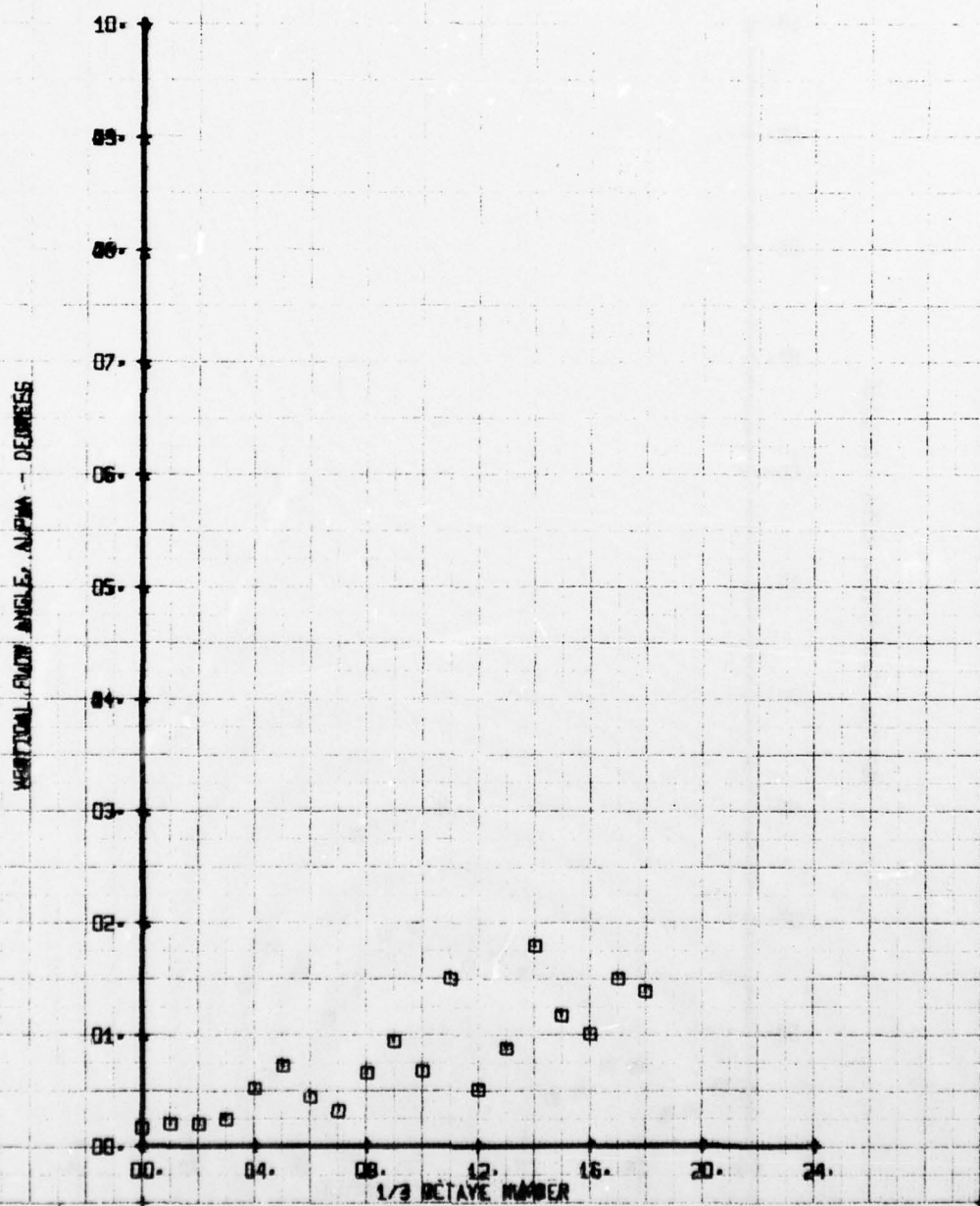
MOT FILM WAKE 1/3 OCTAVE ANALYSIS
 SINGLE SLOTTED FLAPPED WING
 RUN 100 TP 4

LEGEND
 SYM CH PARAMETER
 □ 66 ALPHA



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 SINGLE SLOTTED FLAPPED WING
 RUN 180 TP 5

LEGEND
 SYM CH PARAMETER
 □ 66 ALPHA

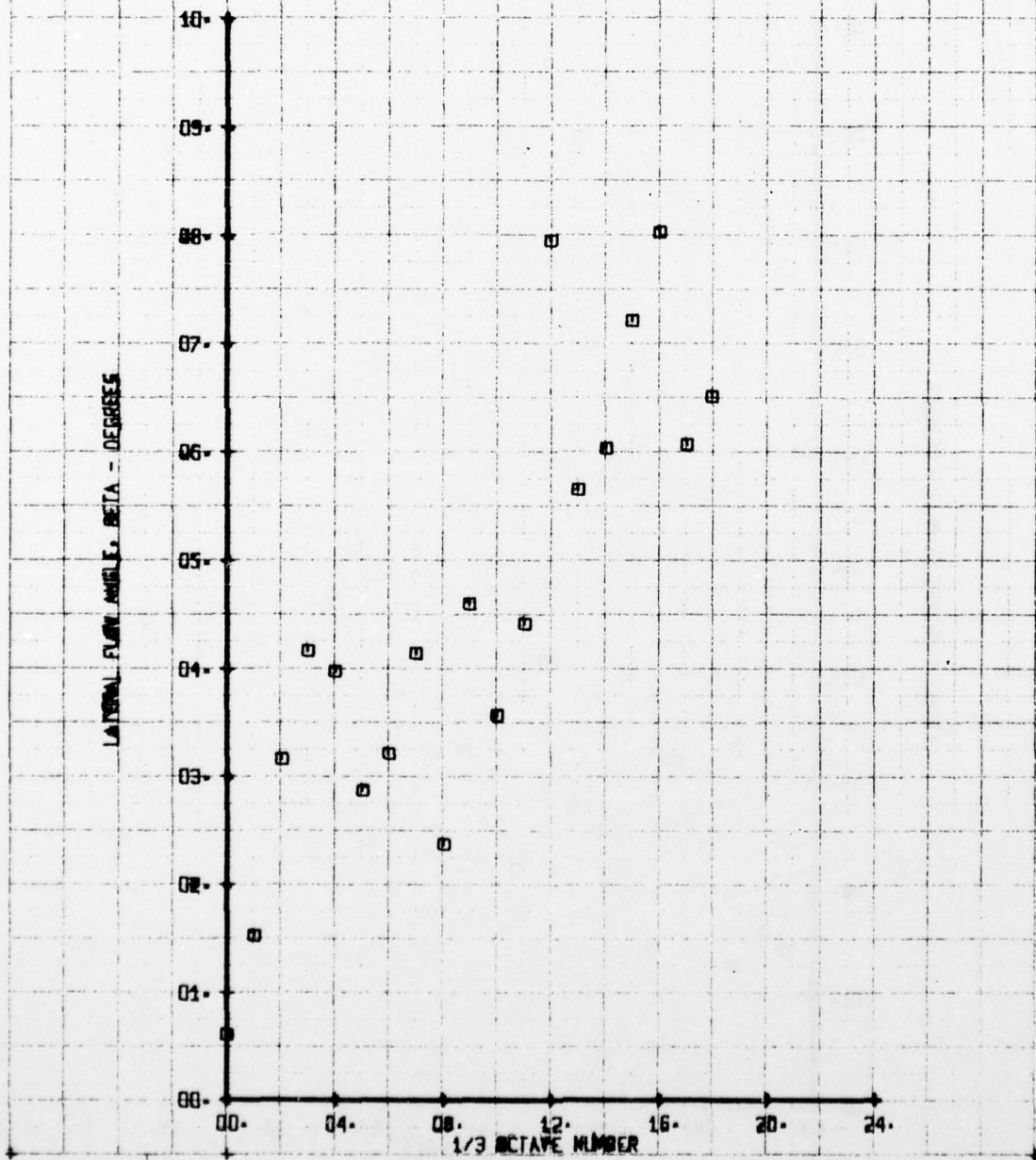


MOT FILM WAKE 1/3 OCTAVE ANALYSIS
 SINGLE SLOTTED FLAPPED WING
 RUN 180 TP 2

SYM
 □

CH
 65

LEGEND
 PARAMETER
 BETA



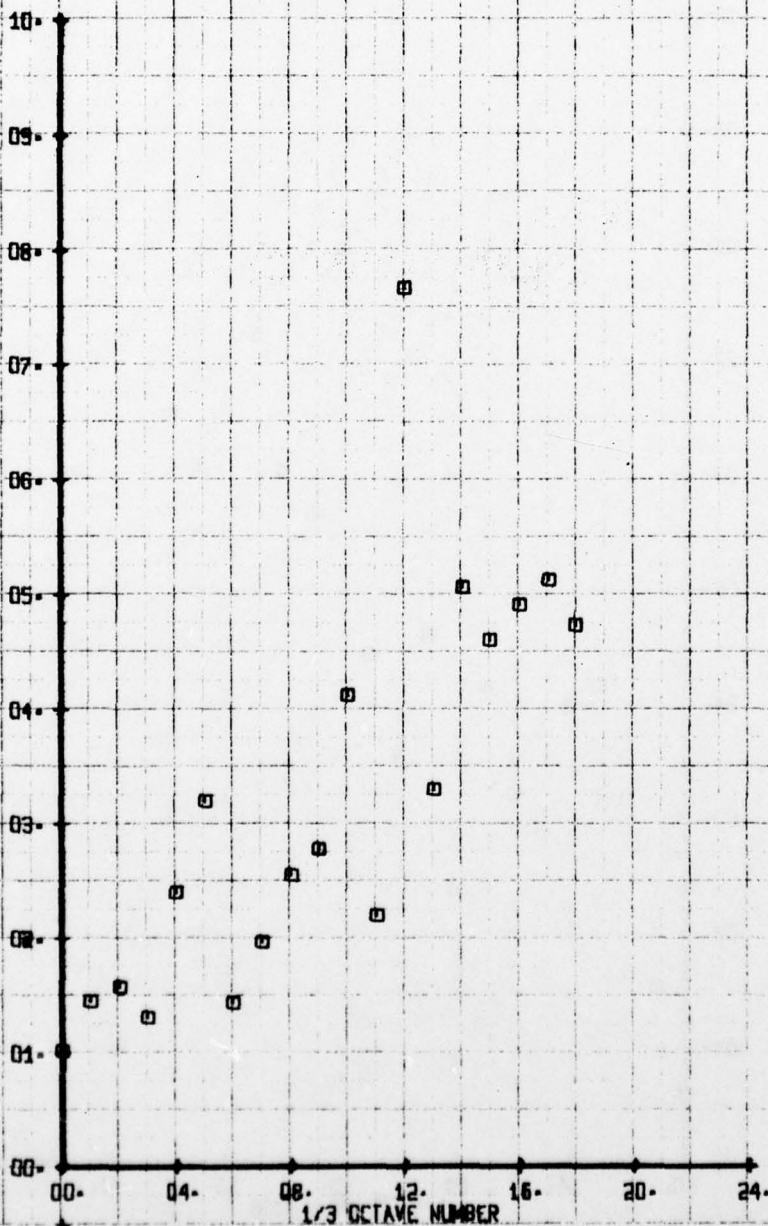
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
SINGLE SLOTTED FLAPPED WING
RUN 100 TP 3

SYM
□

CH
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LEGEND
PARAMETER
BETA

LATERAL FLOW ANGLE, BETA - DEGREES



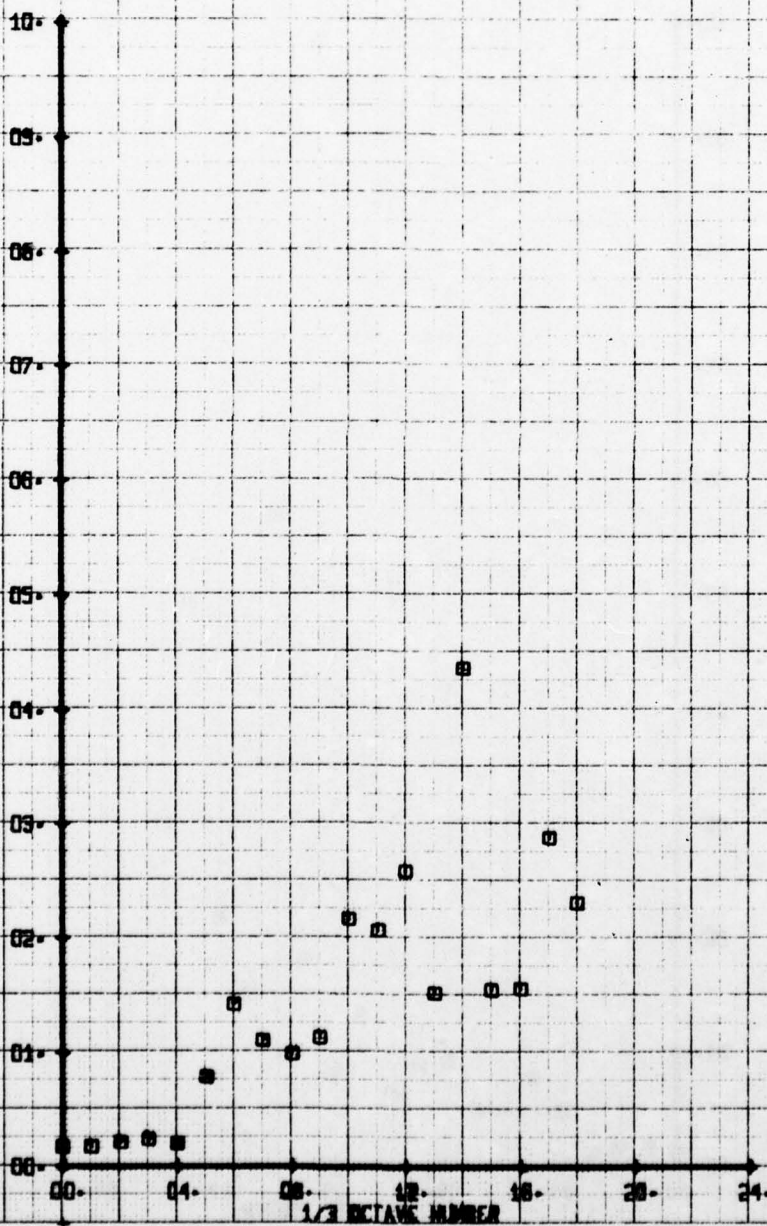
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 SINGLE SLOTTED FLAPPED WING
 RUN 180 TP 4

SYM
 □

CH
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LEGEND
 PARAMETER
 BETA

LATERAL FLOW ANGLE, BETA - DEGREES

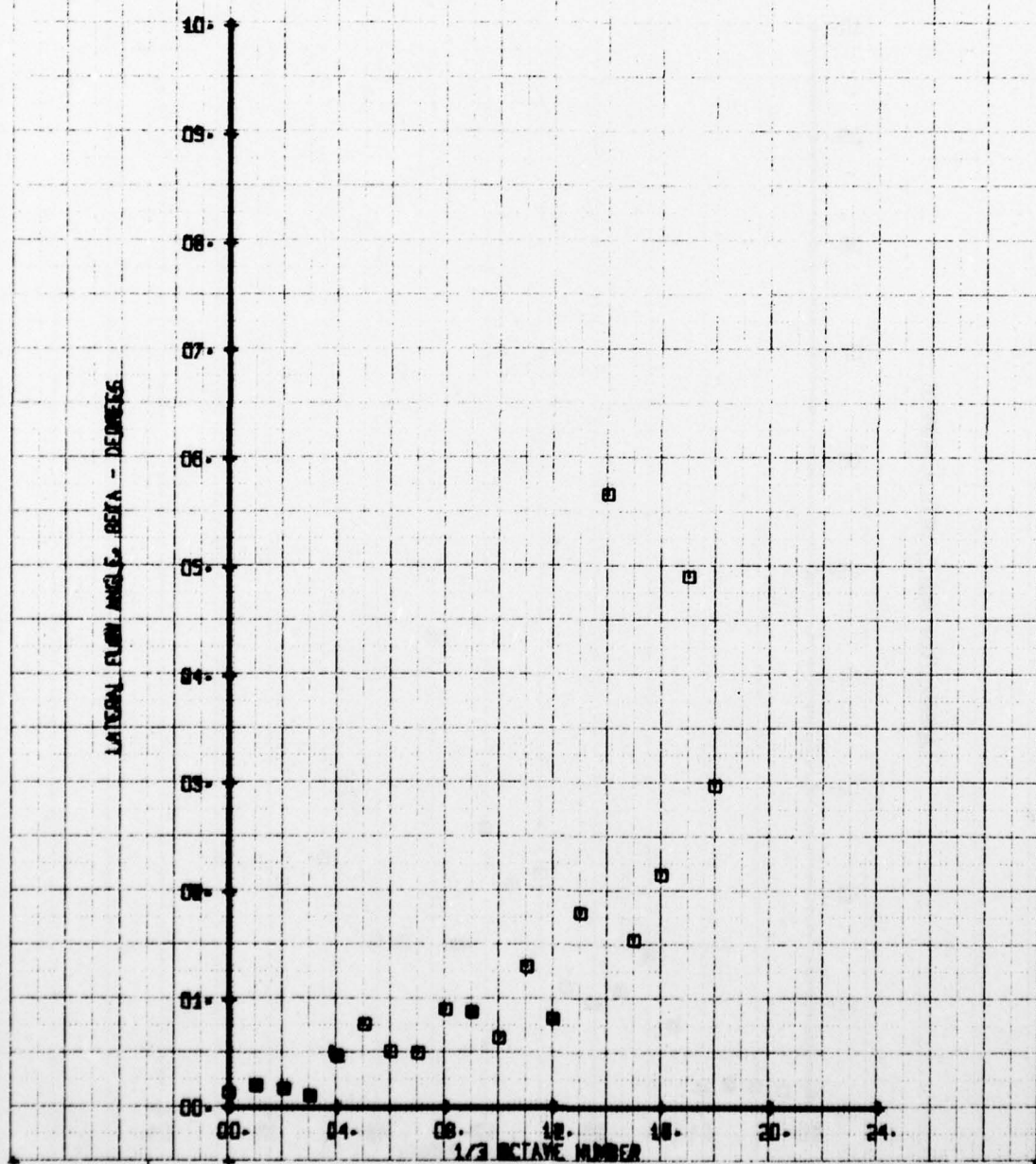


NOT FILM WAKE 1/3 OCTAVE ANALYSIS
 SINGLE SLOTTED FLAPPED WING
 RUN 180 TP 5

SYM
 □

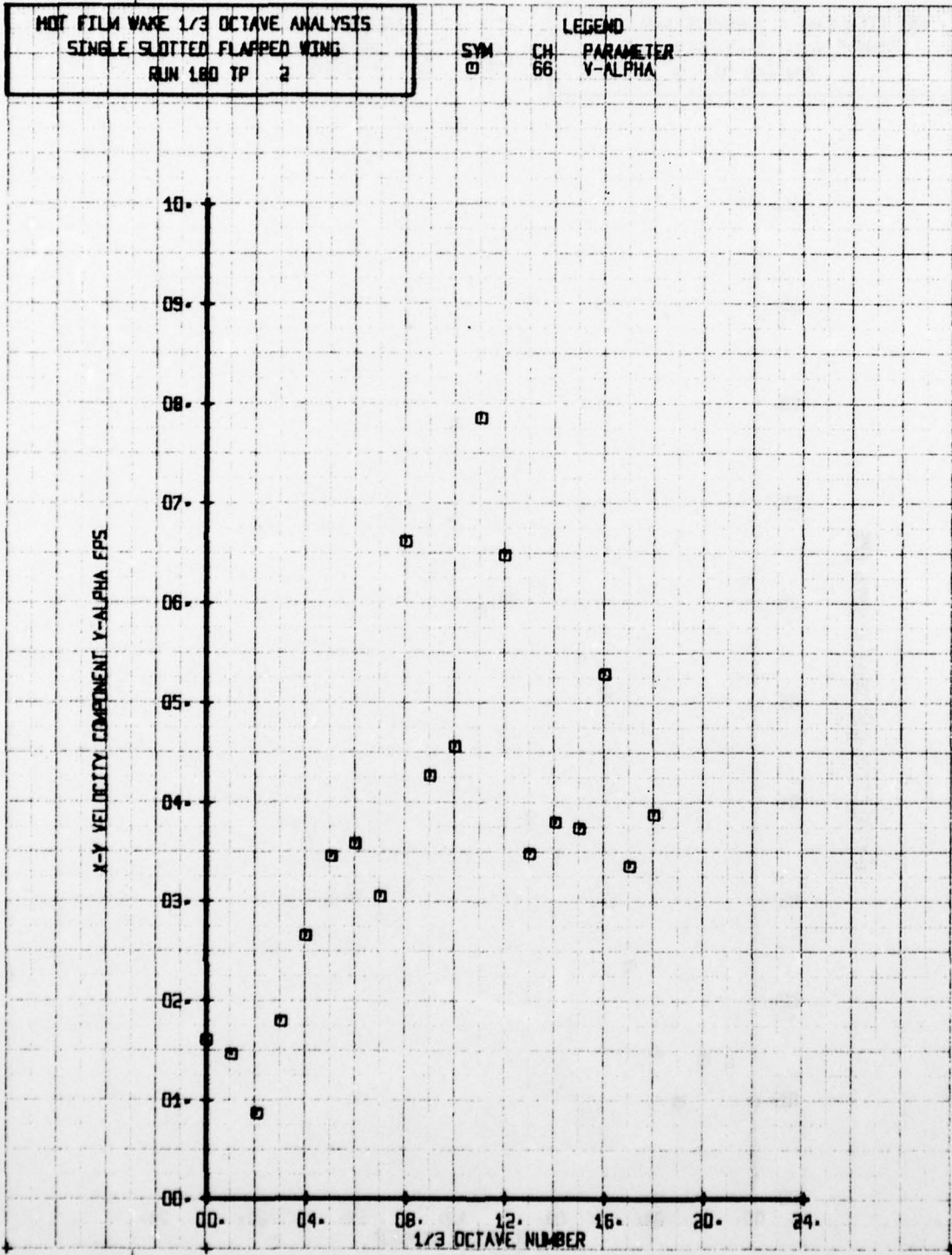
CH
 65

LEGEND
 PARAMETER
 BETA



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 SINGLE SLOTTED FLAPPED WING
 RUN 180 TP 2

SYN CH PARAMETER
 0 66 V-ALPHA



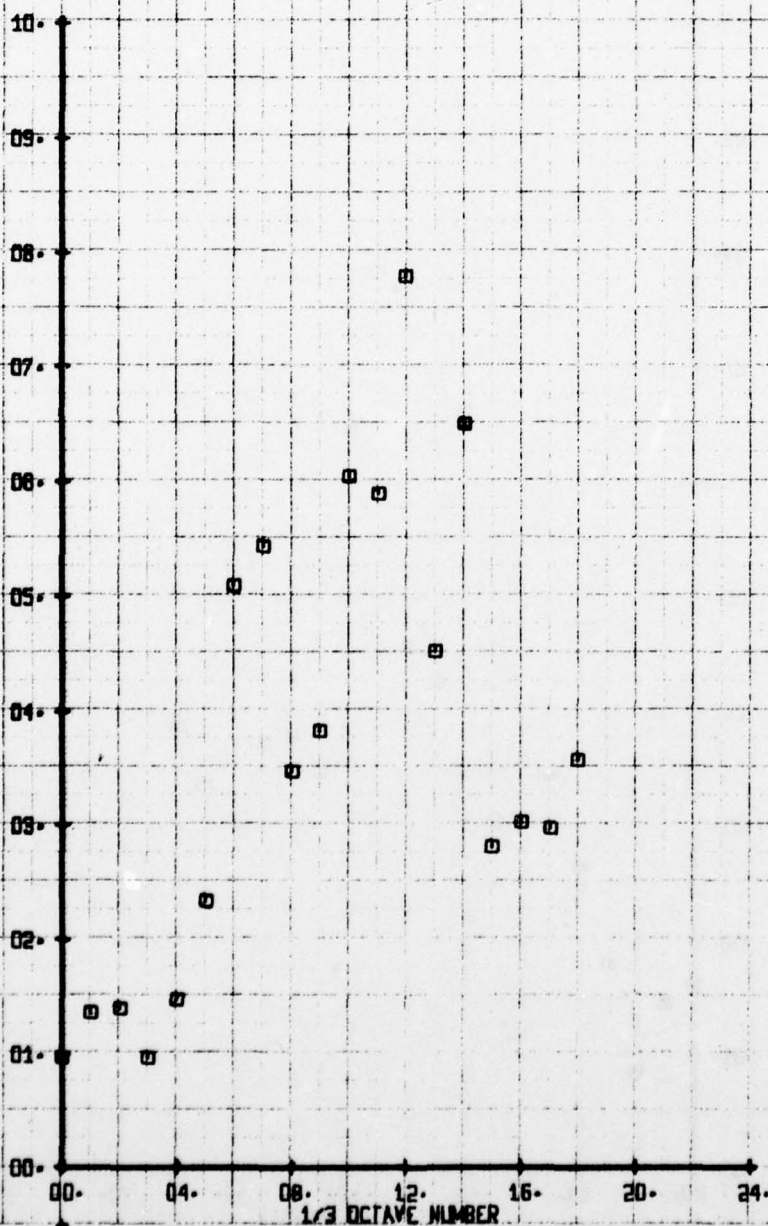
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 SINGLE-SLOTTED FLAPPED WING
 RUN 180 TP 3

SYM
 □

CH
 66

LEGEND
 PARAMETER
 V-ALPHA

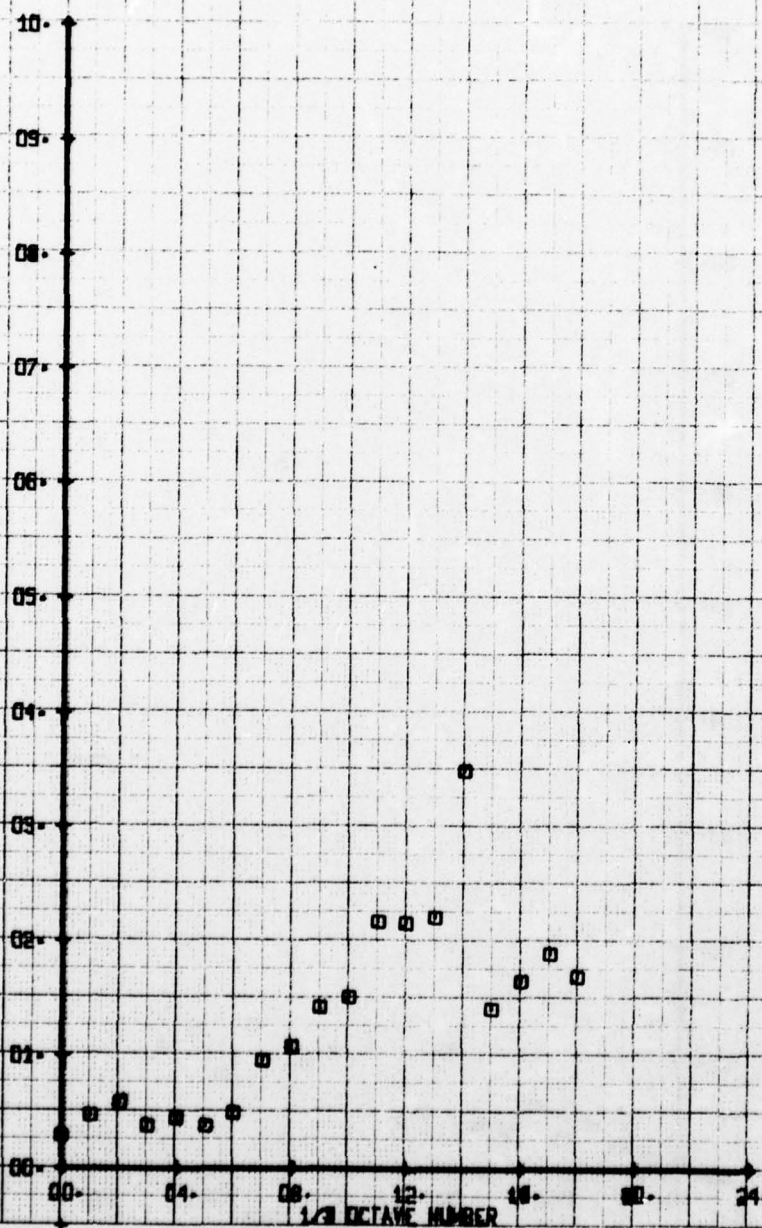
X-Y VELOCITY COMPONENT V-ALPHA FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 SINGLE SLOTTED FLAPPED WING
 RUN 180 TP 4

SYM \square CH 66
 LEGEND
 PARAMETER
 V-ALPHA

X-Y VELOCITY COMPONENT V-ALPHA FPS

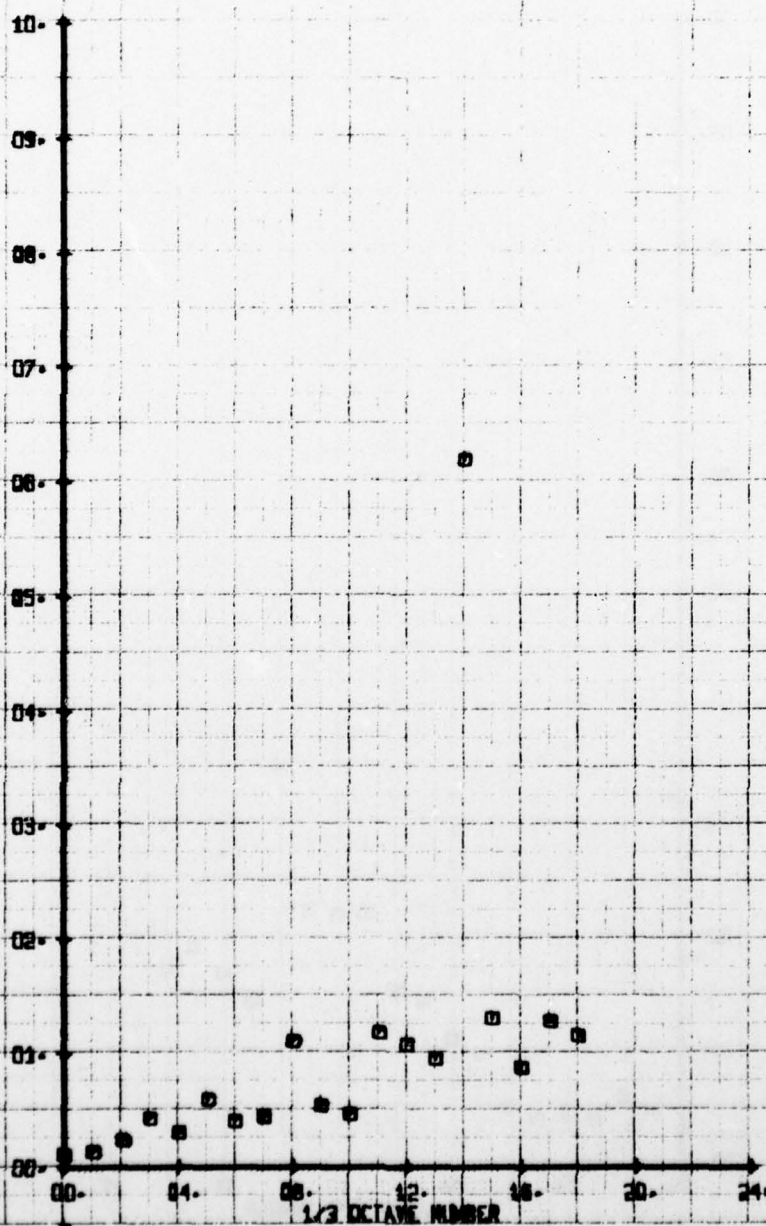


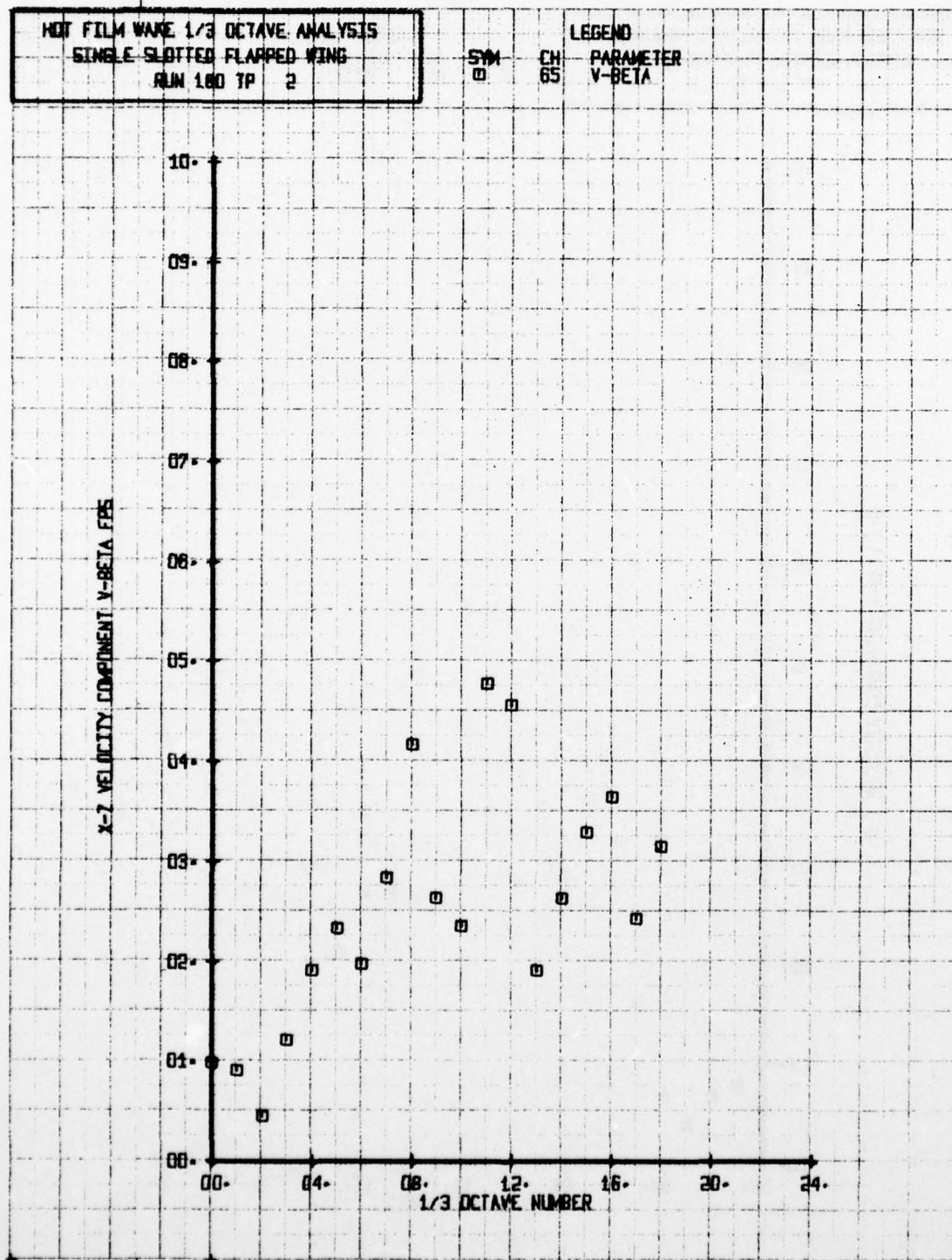
NOT FILM WARE 1/3 OCTAVE ANALYSIS
SINGLE SLOTTED FLAPPED WING
RUN 180 TP 5

SYM
□

LEGEND
CH 66
PARAMETER
V-ALPHA

1/3 VELOCITY COMPONENT V-ALPHA FPS





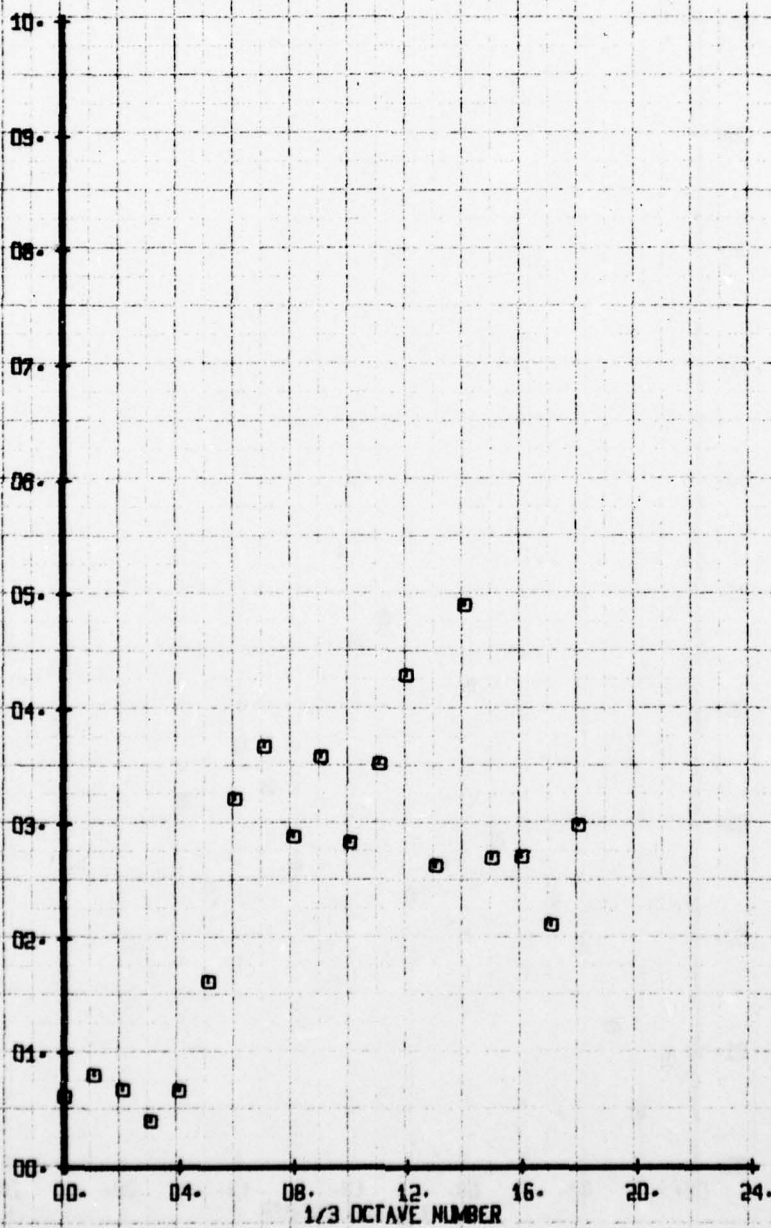
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 SINGLE SLOTTED FLAPPED WING
 RUN 180 TP 3

SYM
 □

CH
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LEGEND
 PARAMETER
 V-BETA

X-2 VELOCITY COMPONENT V-BETA FPS

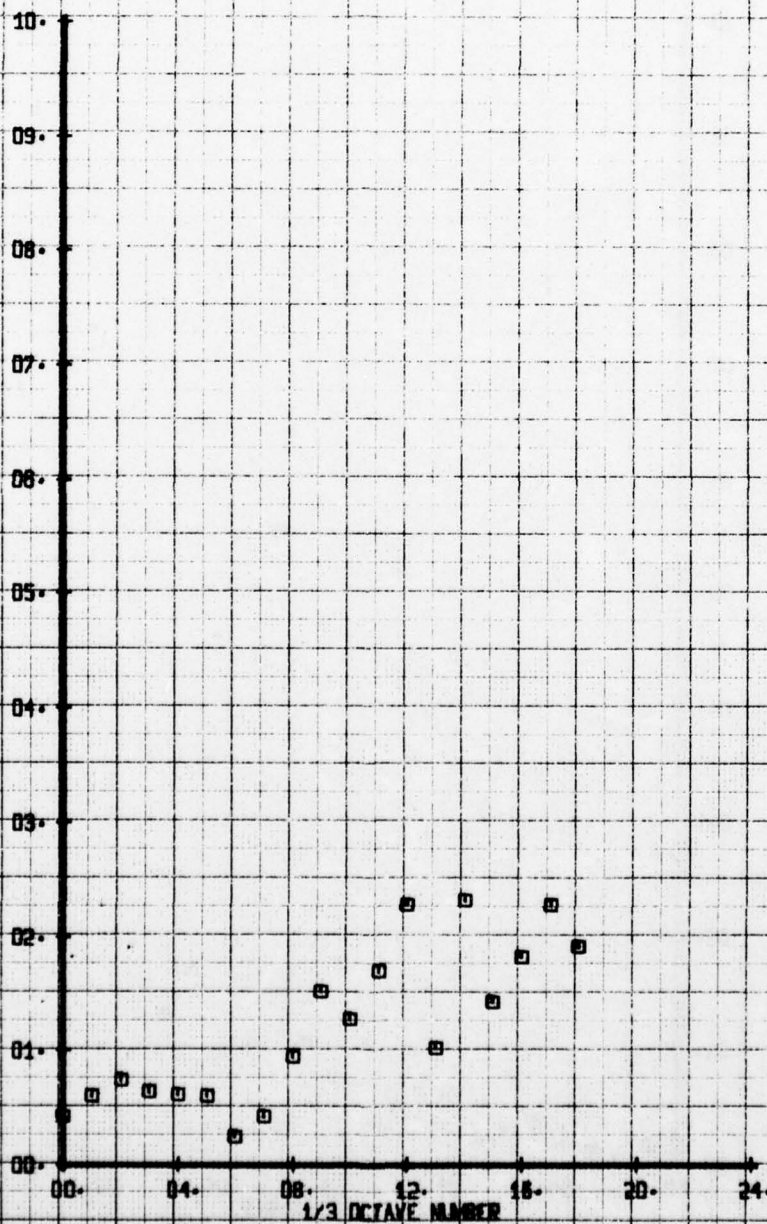


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 SINGLE SLOTTED FLAPPED WING
 RUN 180 TP 4

SYM
 □

LEGEND
 CH 65
 PARAMETER
 V-BETA

X-2 VELOCITY COMPONENT V-BETA FFS

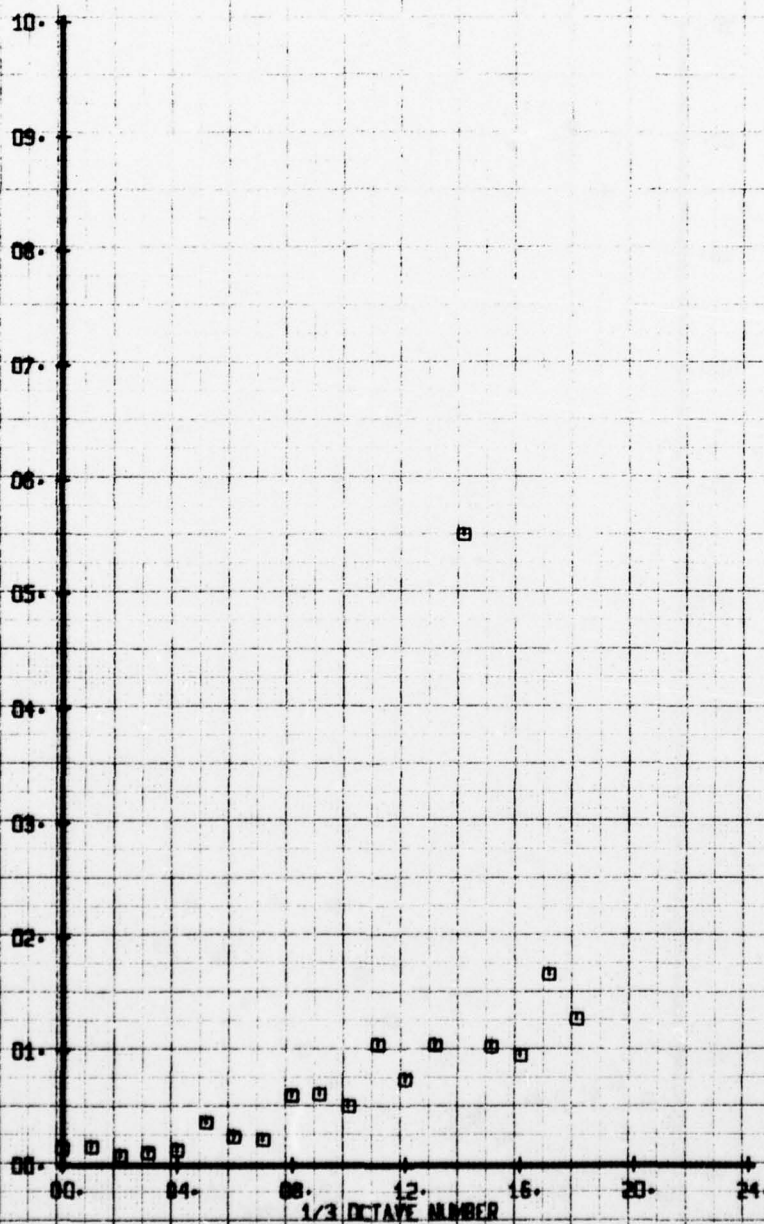


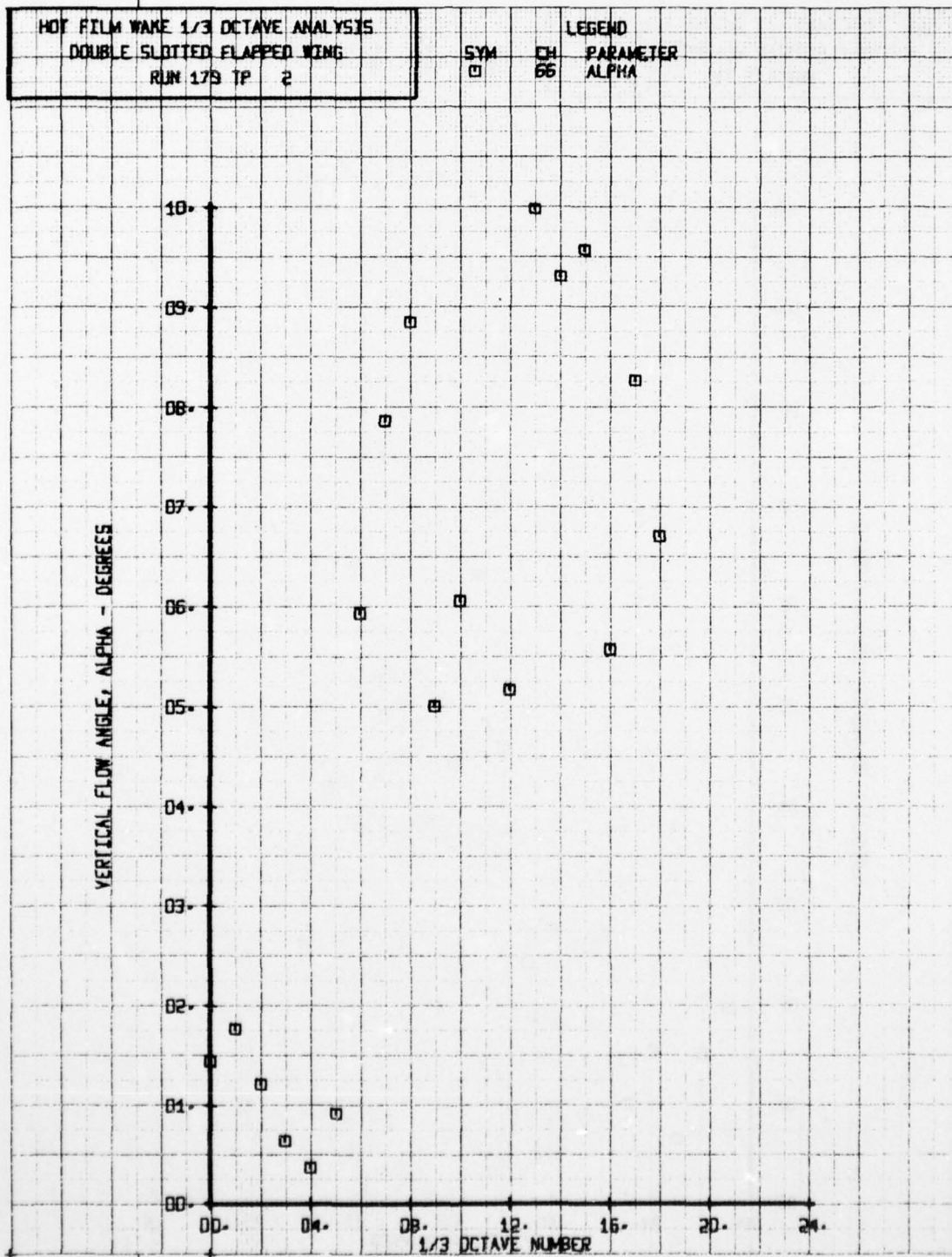
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 SINGLE SLOTTED FLAPPED WING
 RUN 180 TP 5

SYM
 □

LEGEND
 CH 65
 PARAMETER
 V-BETA

X-Z VELOCITY COMPONENT V-BETA FPS





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INTERACTIONAL AERODYNAMICS OF THE SINGLE ROTOR HELICOPTER CONF--ETC(U)

SEP 78 P F SHERIDAN

DAAJ02-77-C-0020

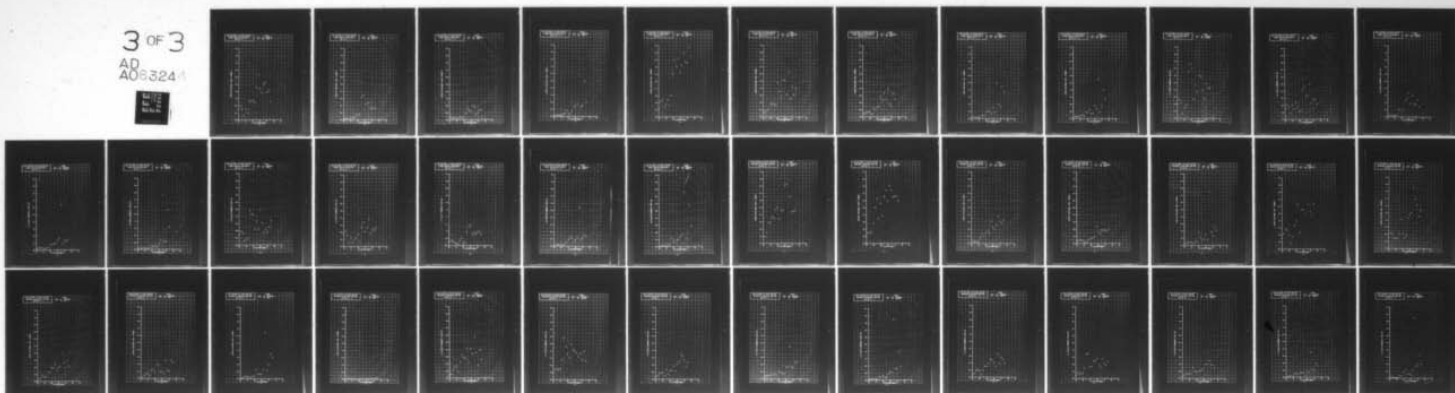
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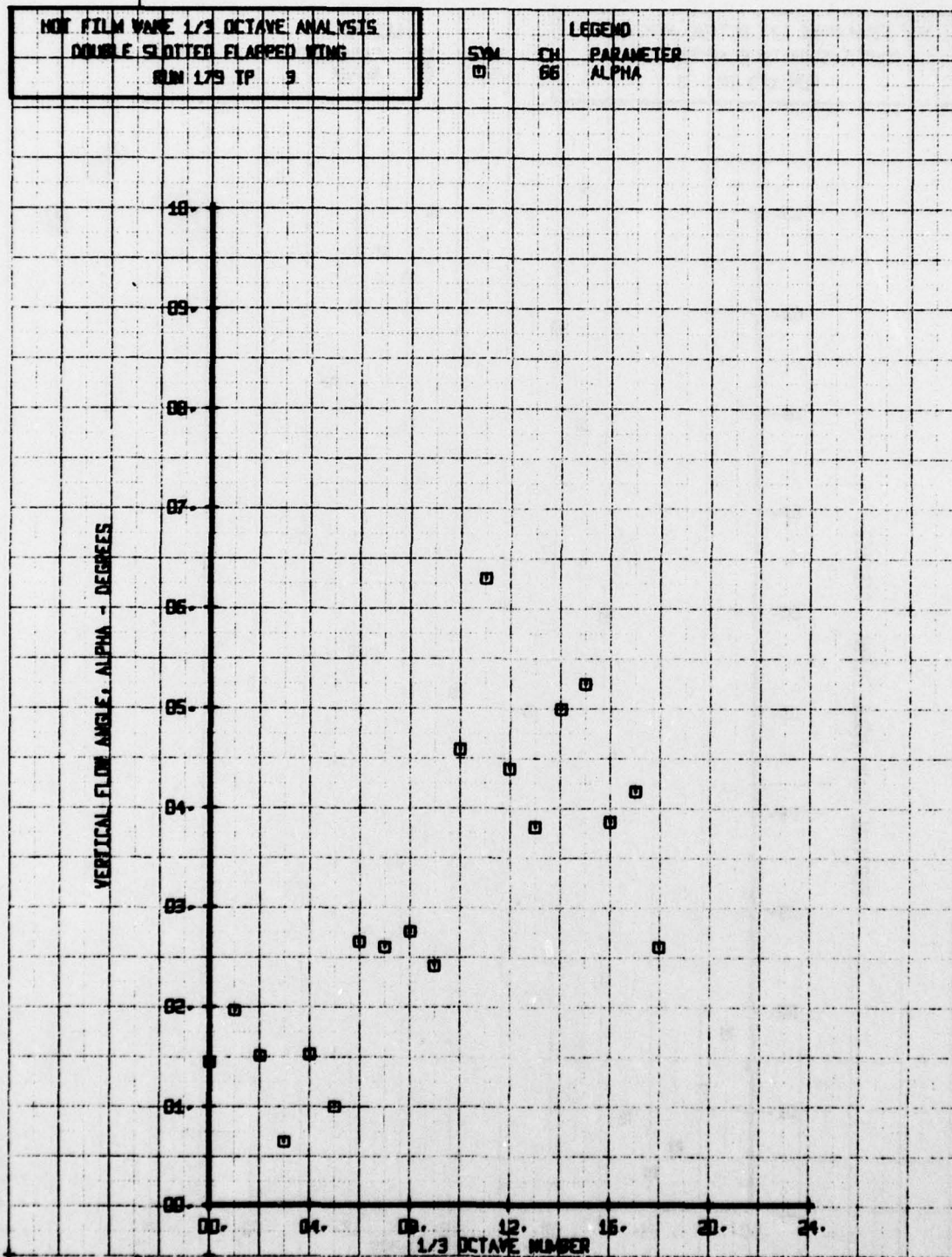
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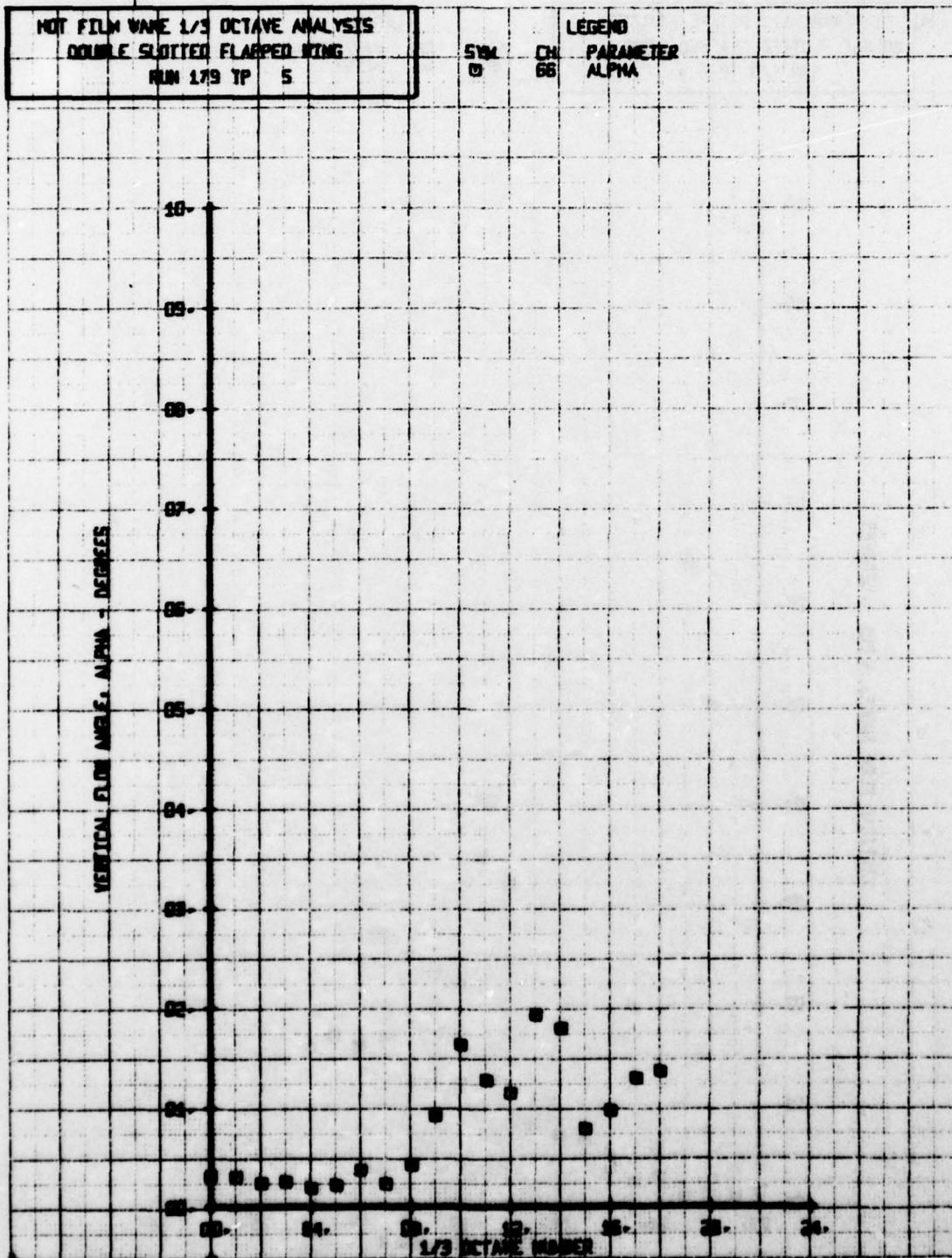


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3-79
DDC



NOT FILM WAVE 1/3 OCTAVE ANALYSIS
 DOUBLE SLOTTED FLAPPED RING
 RUN 179 TP 5

SYM	CH	LEGEND
0	66	PARAMETER ALPHA



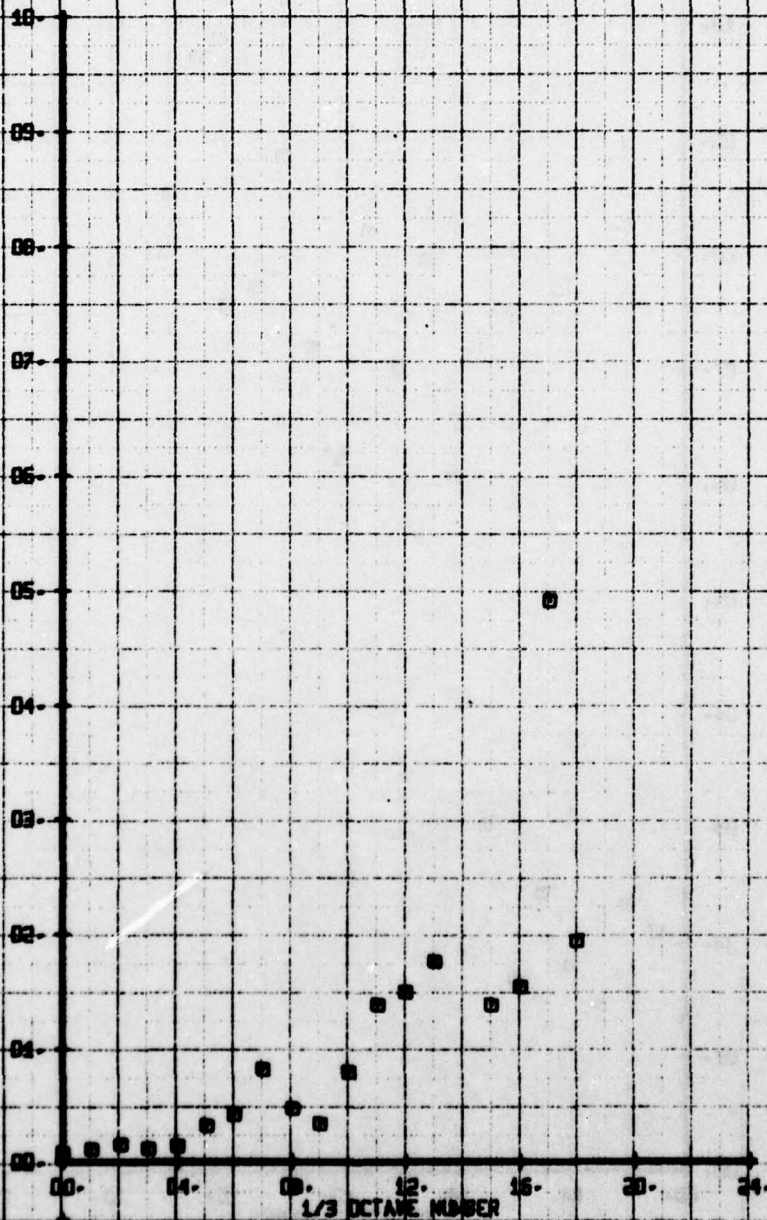
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 DOUBLE SLOTTED FLAPPED WING
 RUN 179 TP 5

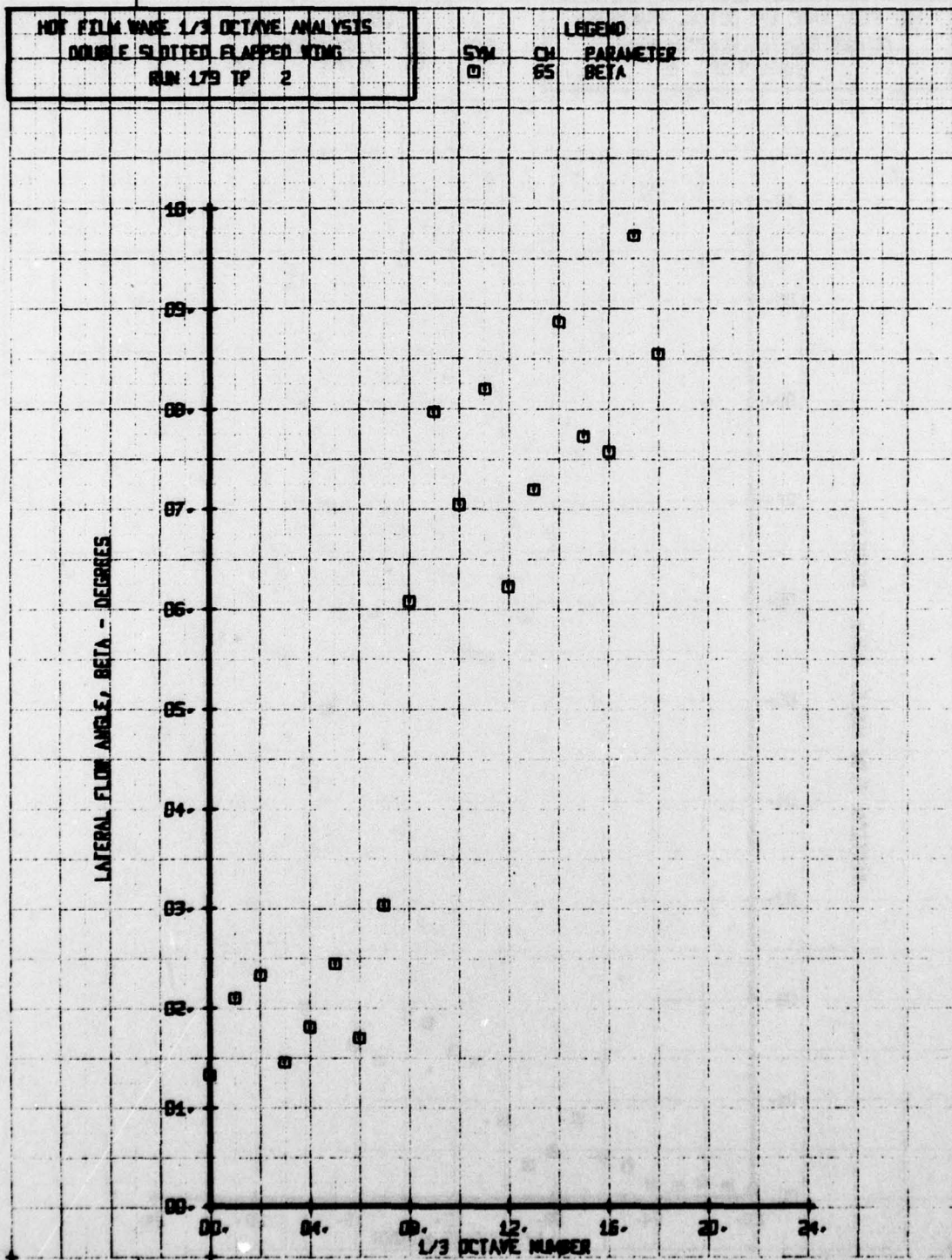
SYM
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CH
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LEGEND
 PARAMETER
 ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES





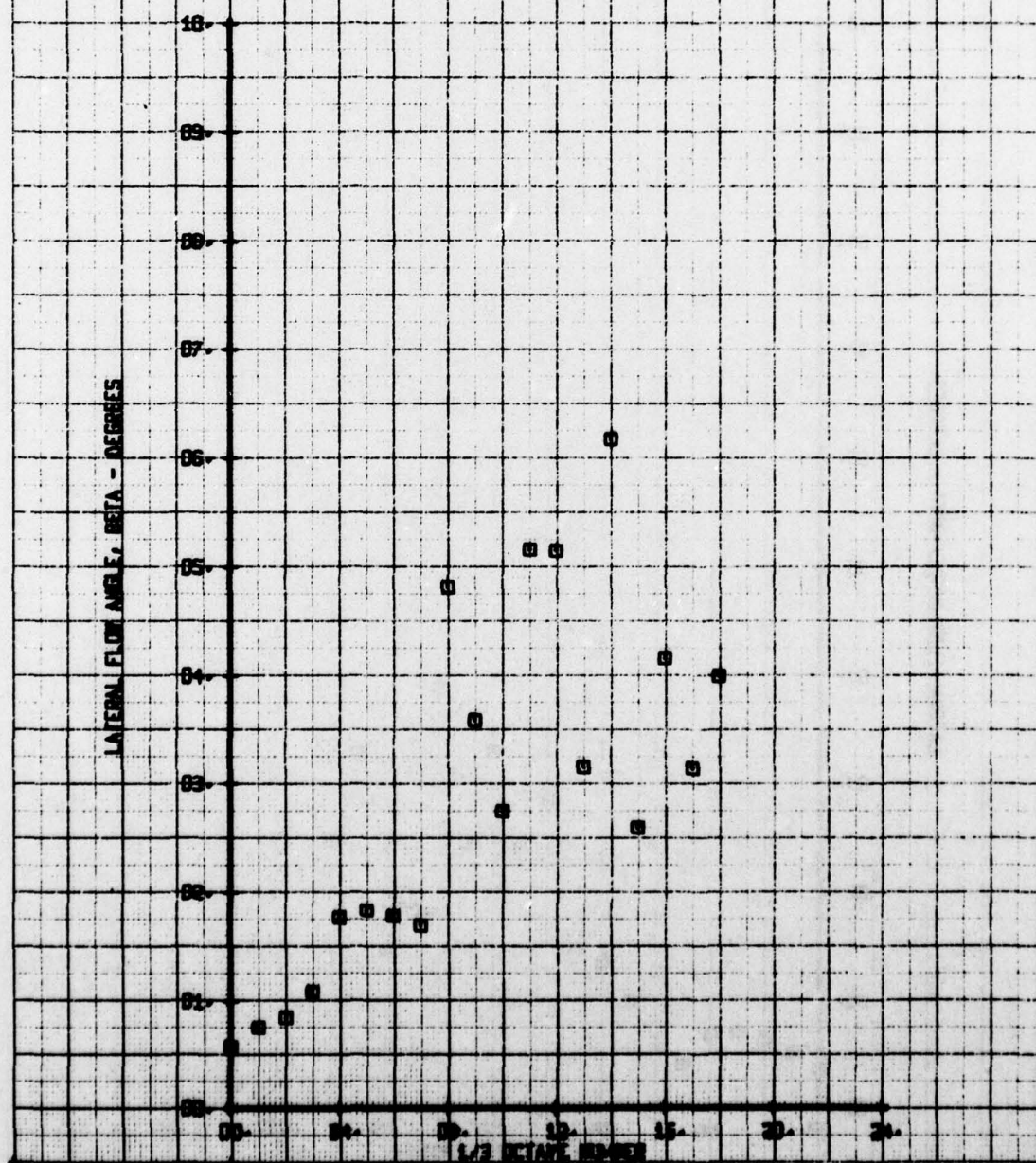
NOT FILM WAKE 1/3 OCTAVE ANALYSIS
 DOUBLE SLOTTED FLAPPED RING
 RUN 179 TP 3

SYM
 □

CH
 65

LEGEND
 PARAMETER
 BETA

LATERAL FLOW ANGLE, BETA - DEGREES



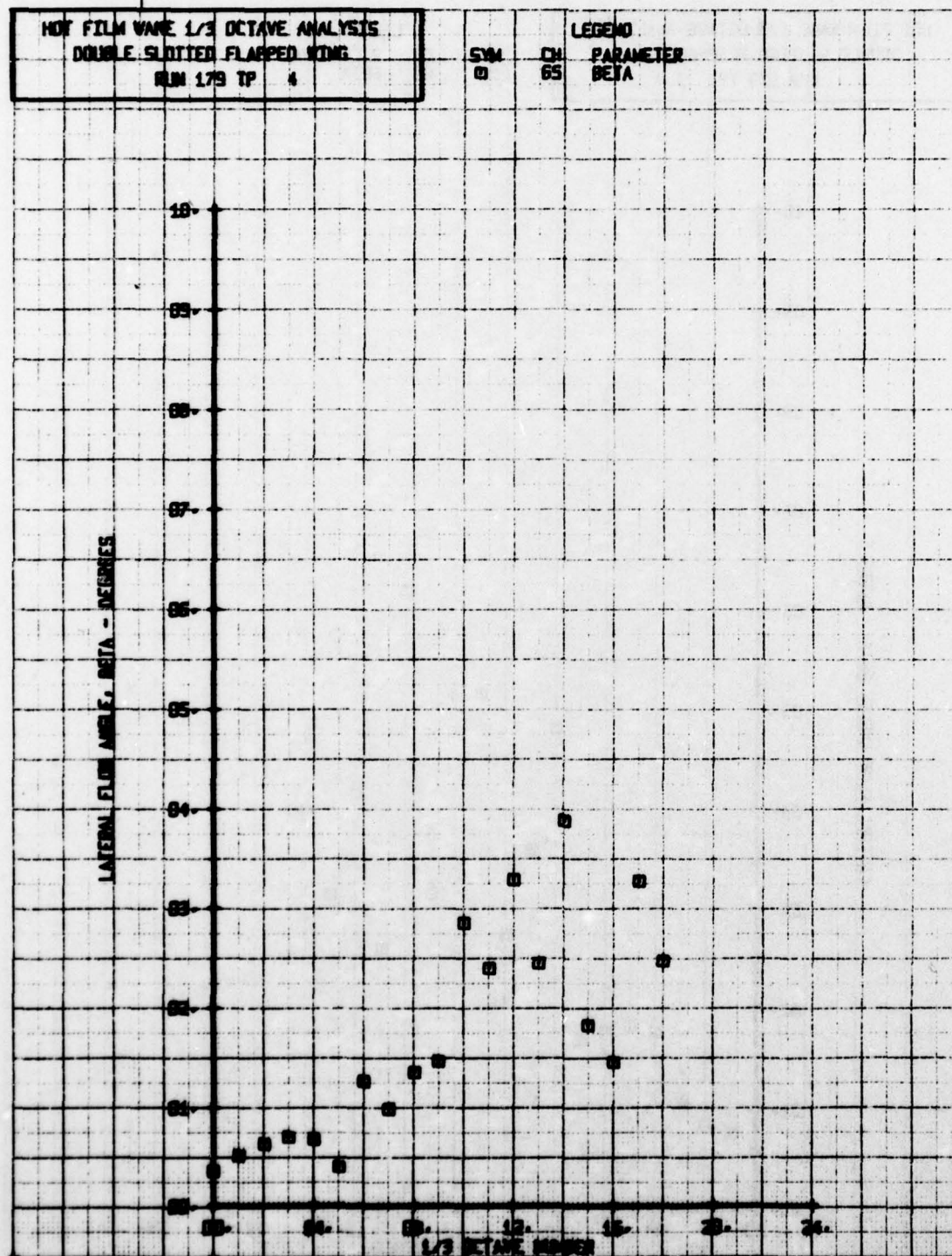
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 DOUBLE SLOTTED FLAPPED WING
 RUN 179 TP 4

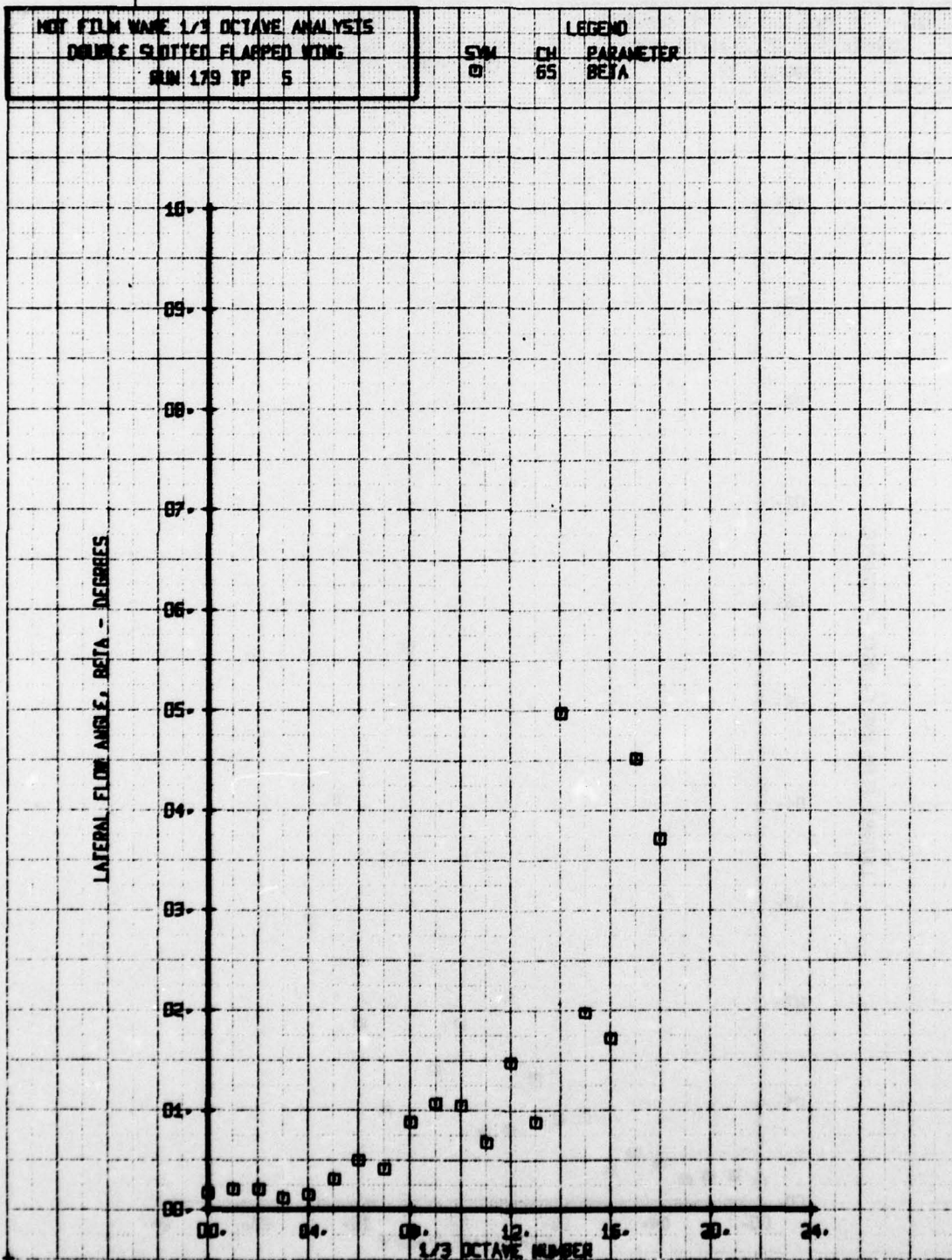
SUM
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CH
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LEGEND
 PARAMETER
 BETA

LATERAL FLUX ANGLE, BETA - DEGREES

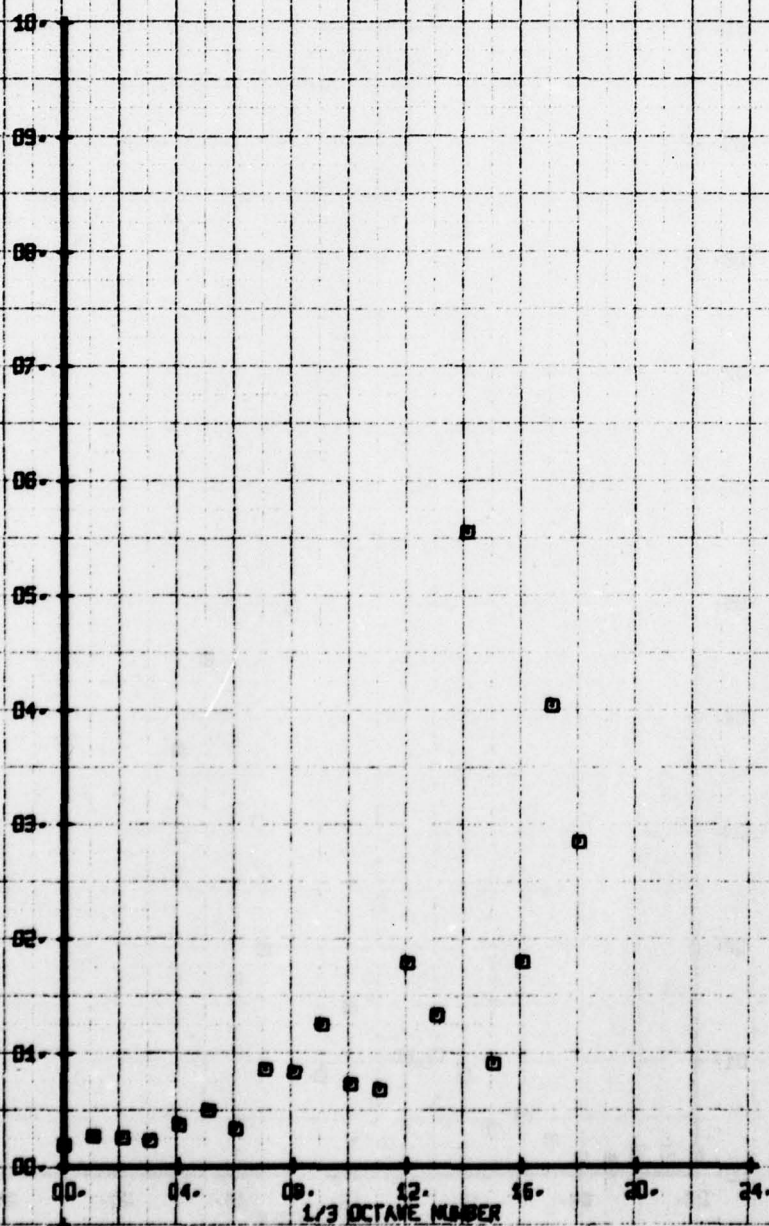




HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 DOUBLE SLOTTED FLAPPED WING
 RUN 179 TP 6

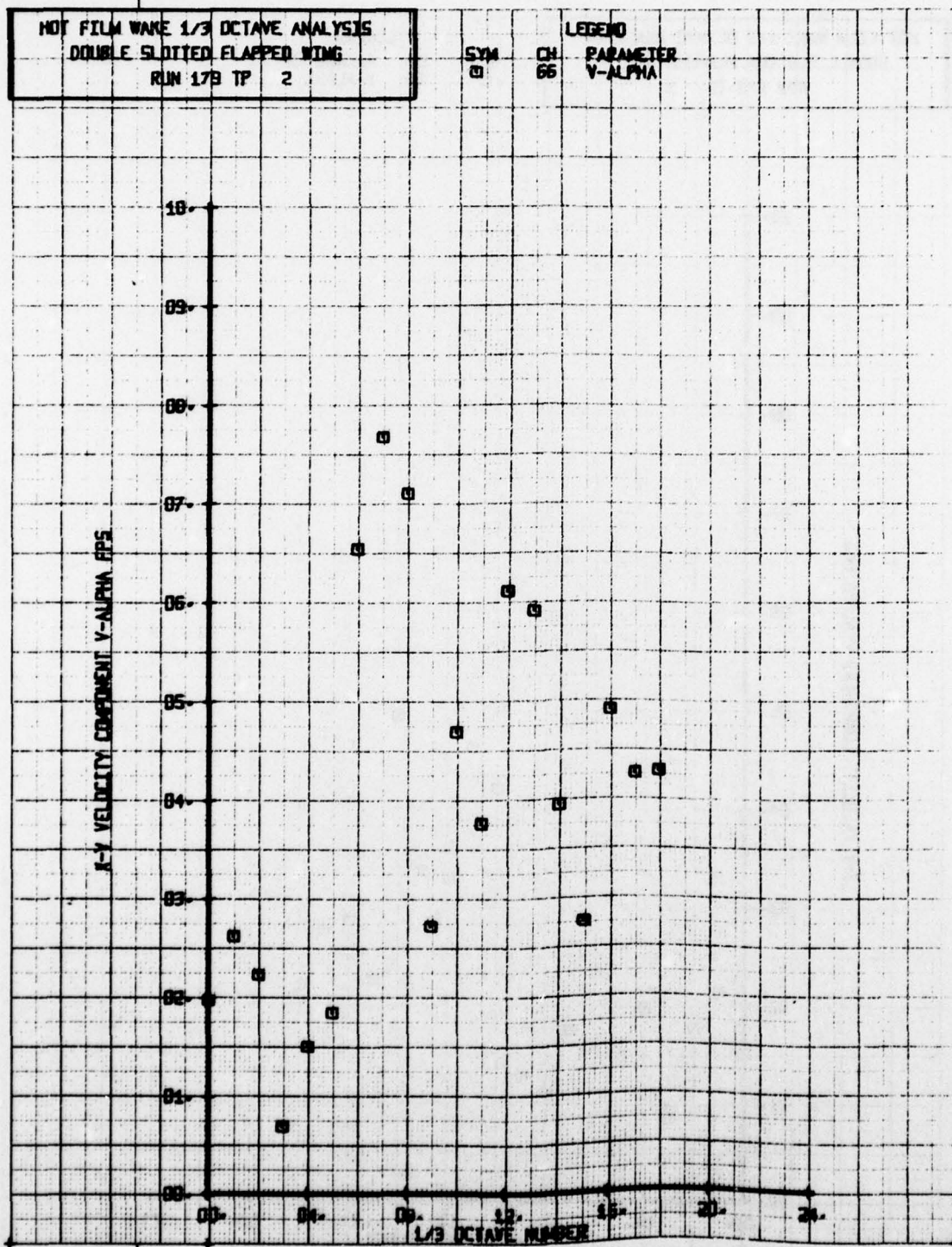
SYM CM PARAMETER
 □ 65 BETA

LATERAL FLOW ANGLE, BETA - DEGREES



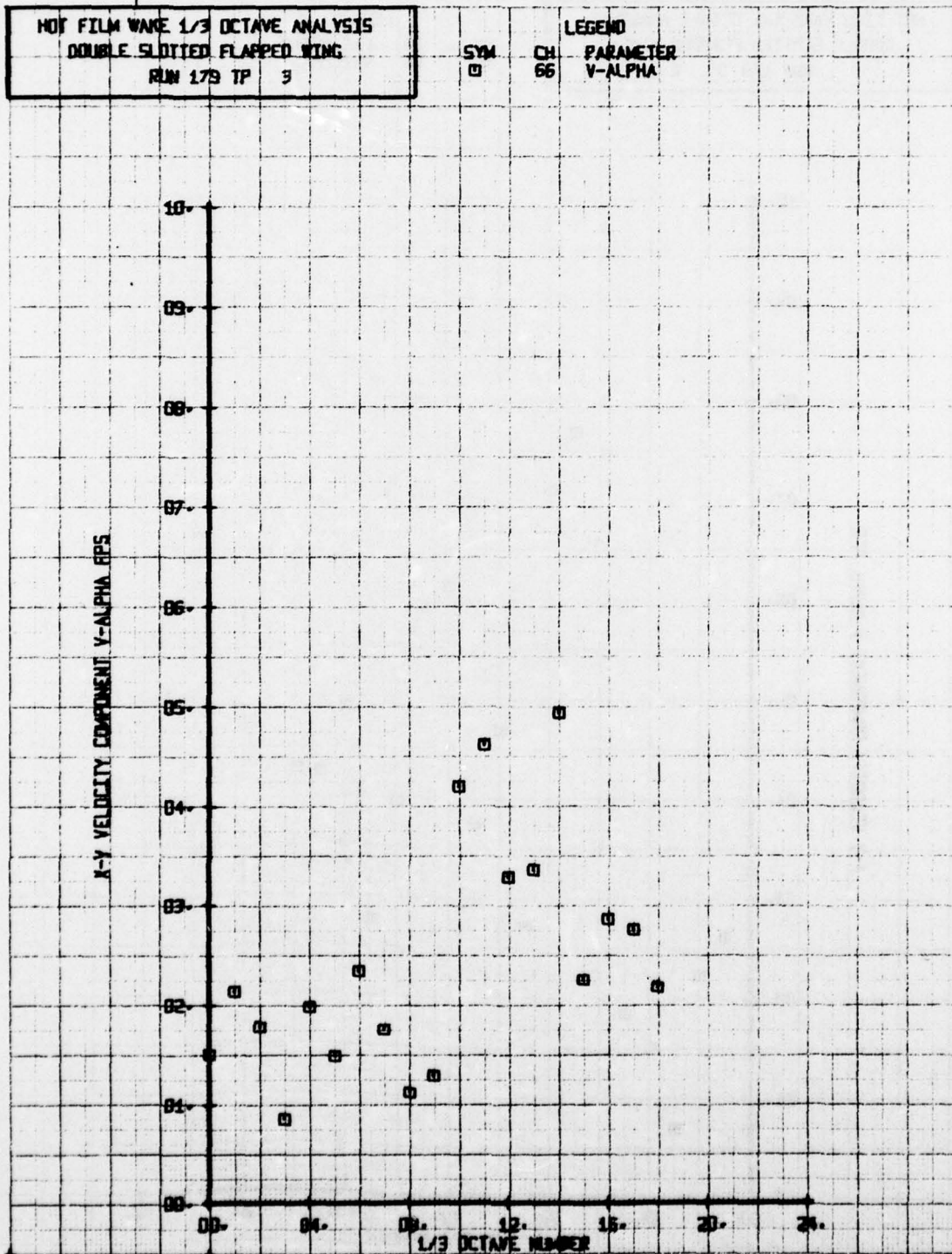
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 DOUBLE SLOTTED FLAPPED WING
 RUN 179 TP 2

SYM CH
 01 66
 LEGEND
 PARAMETER
 V-ALPHA



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 DOUBLE SLOTTED FLAPPED WING
 RUN 179 TP 3

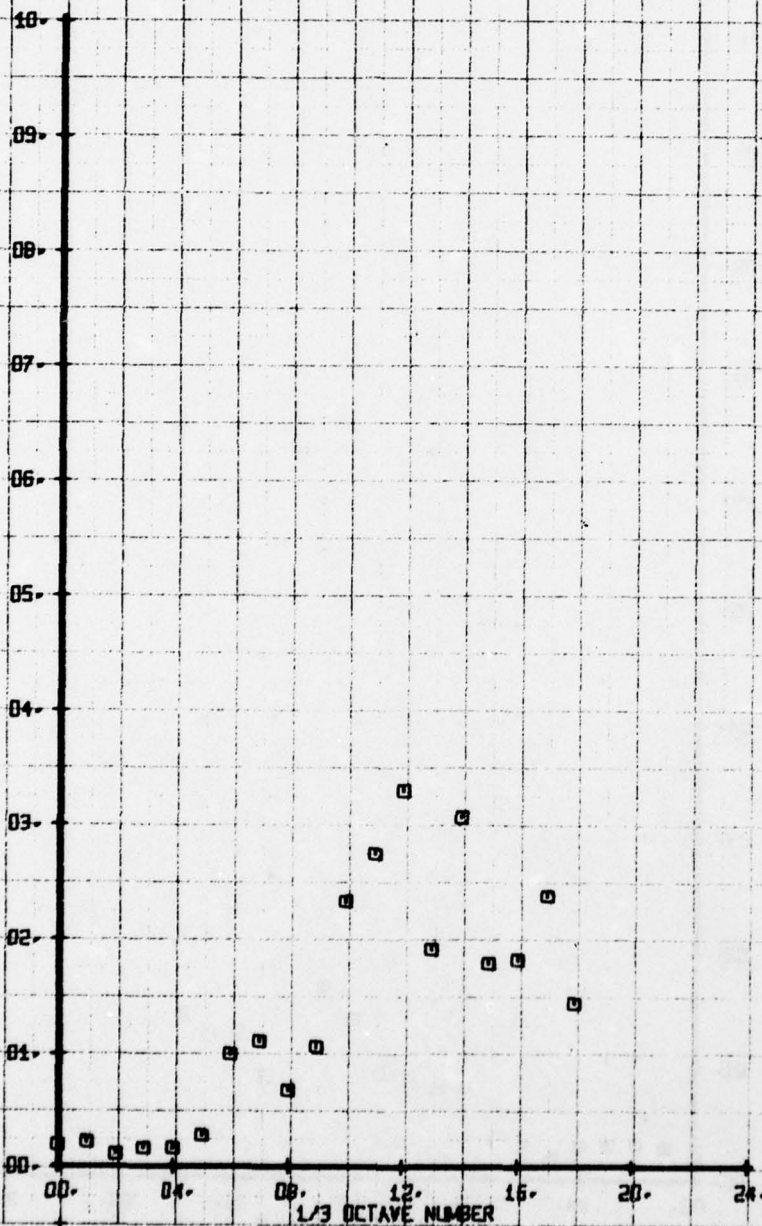
SYM CH
 □ 66
 LEGEND
 PARAMETER
 V-ALPHA



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 DOUBLE SLOTTED FLAPPED WING
 RUN 179 TP 4

SYM CH
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 LEGEND
 PARAMETER
 V-ALPHA

K-Y VELOCITY COMPONENT V-ALPHA FPS



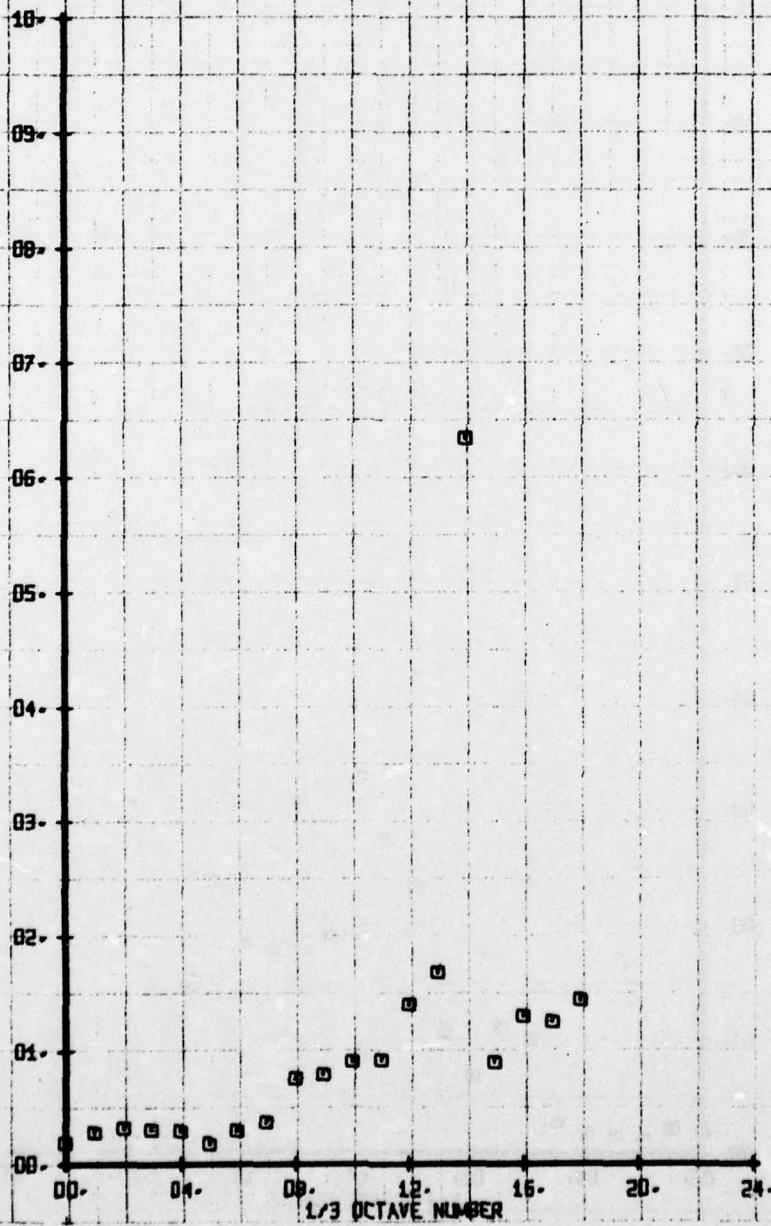
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 DOUBLE SLOTTED FLAPPED WING
 RUN 179 TP 5

SYM
 □

CH
 66

LEGEND
 PARAMETER
 V-ALPHA

K-Y VELOCITY COMPONENT V-ALPHA FPS



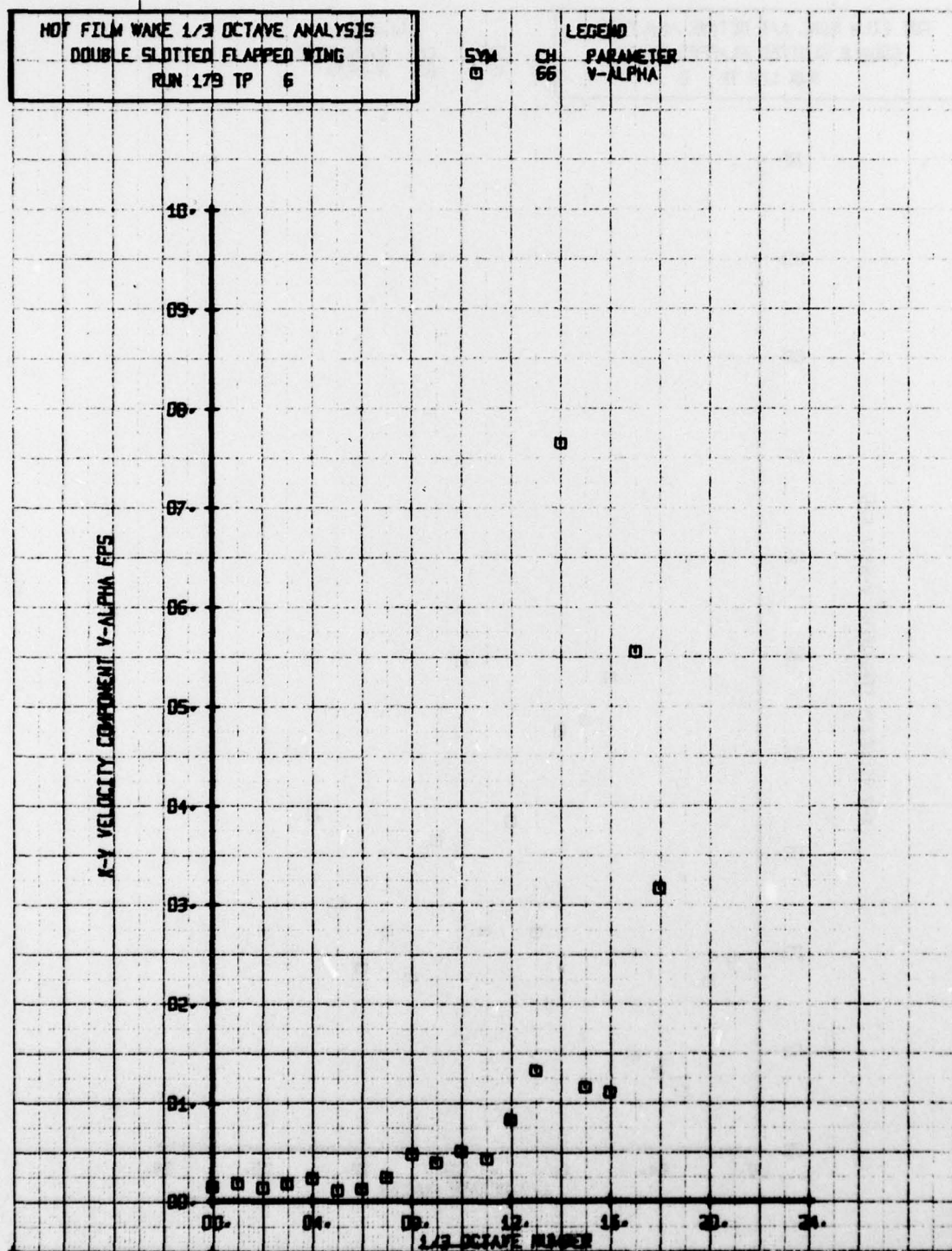
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 DOUBLE SLOTTED FLAPPED WING
 RUN 179 TP 6

SYM
 □

CH
 66

LEGEND
 PARAMETER
 V-ALPHA

K-Y VELOCITY COMPONENT V-ALPHA FPS



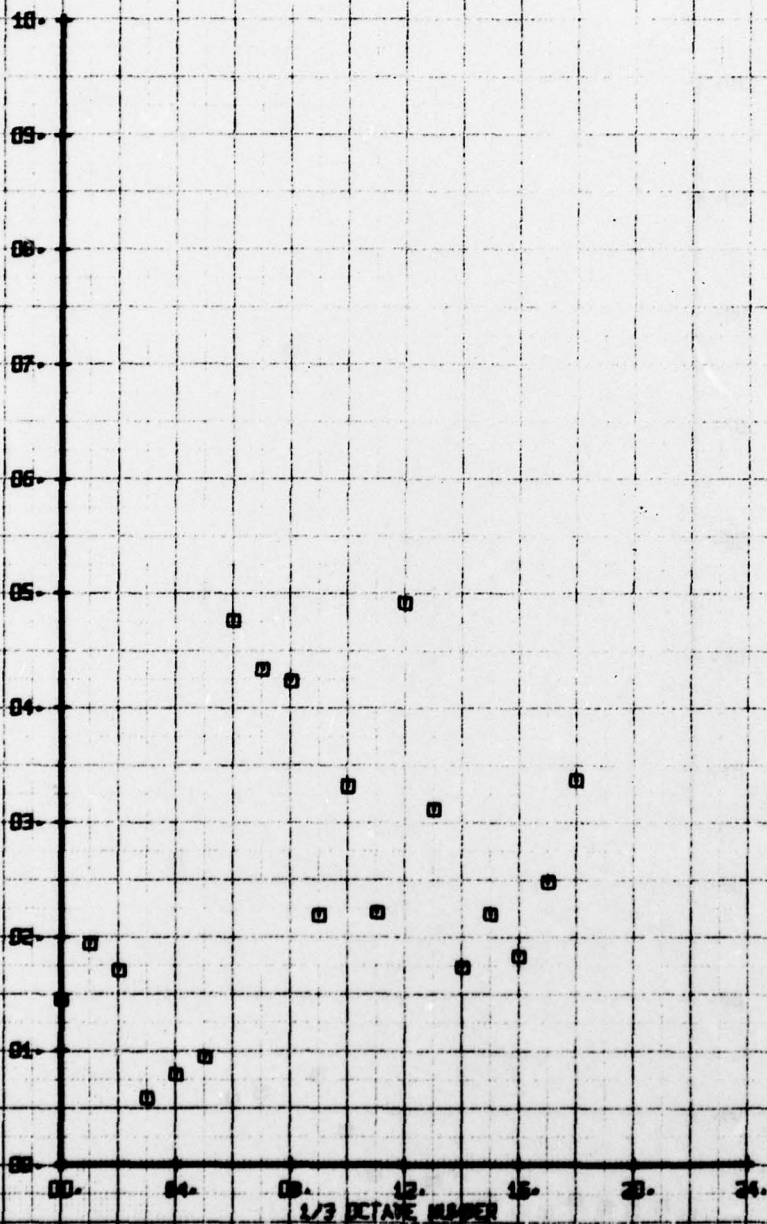
NOT FILM WAKE 1/3 OCTAVE ANALYSIS
 DOUBLE SLOTTED FLAPPED WING
 RUN 179 TP 2

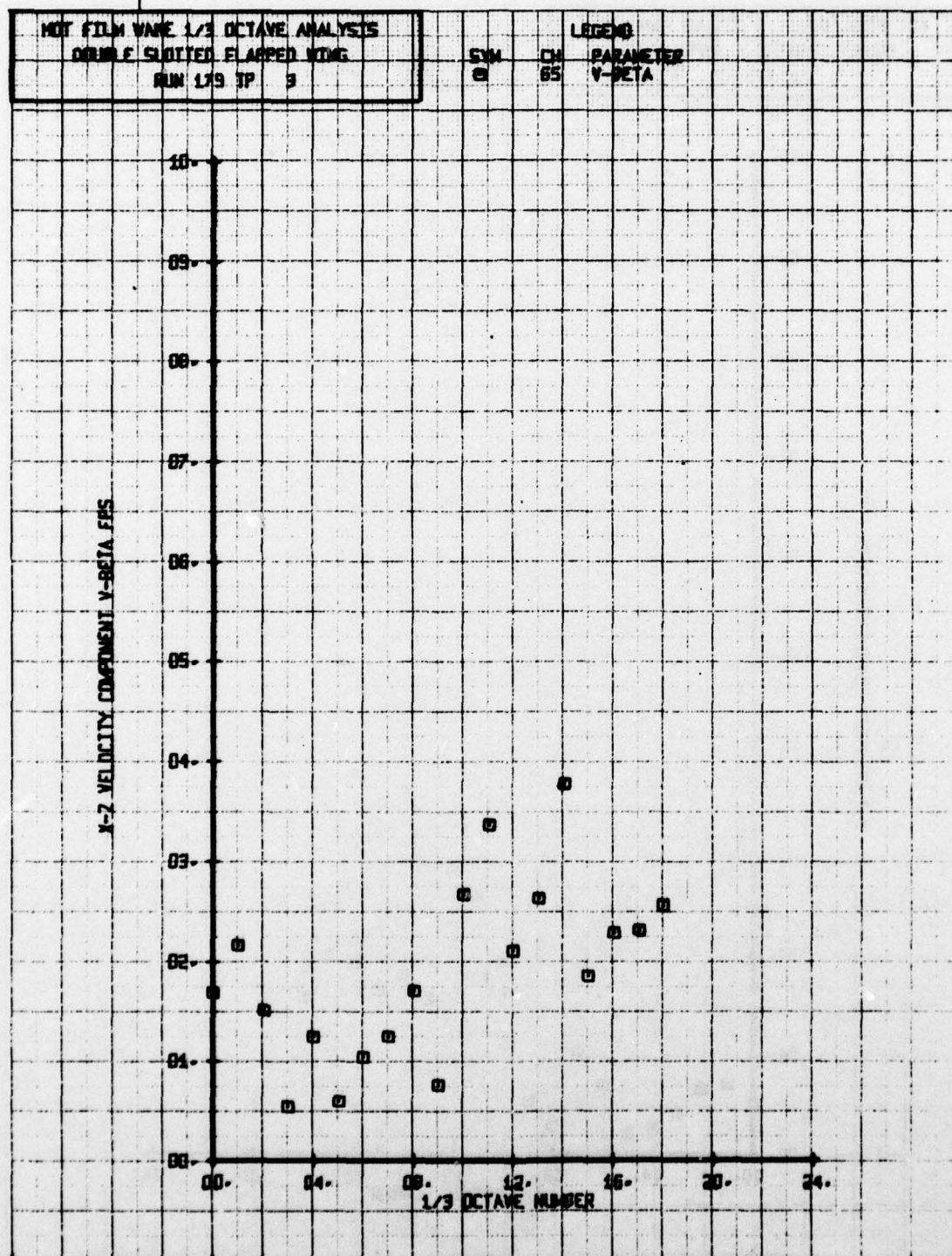
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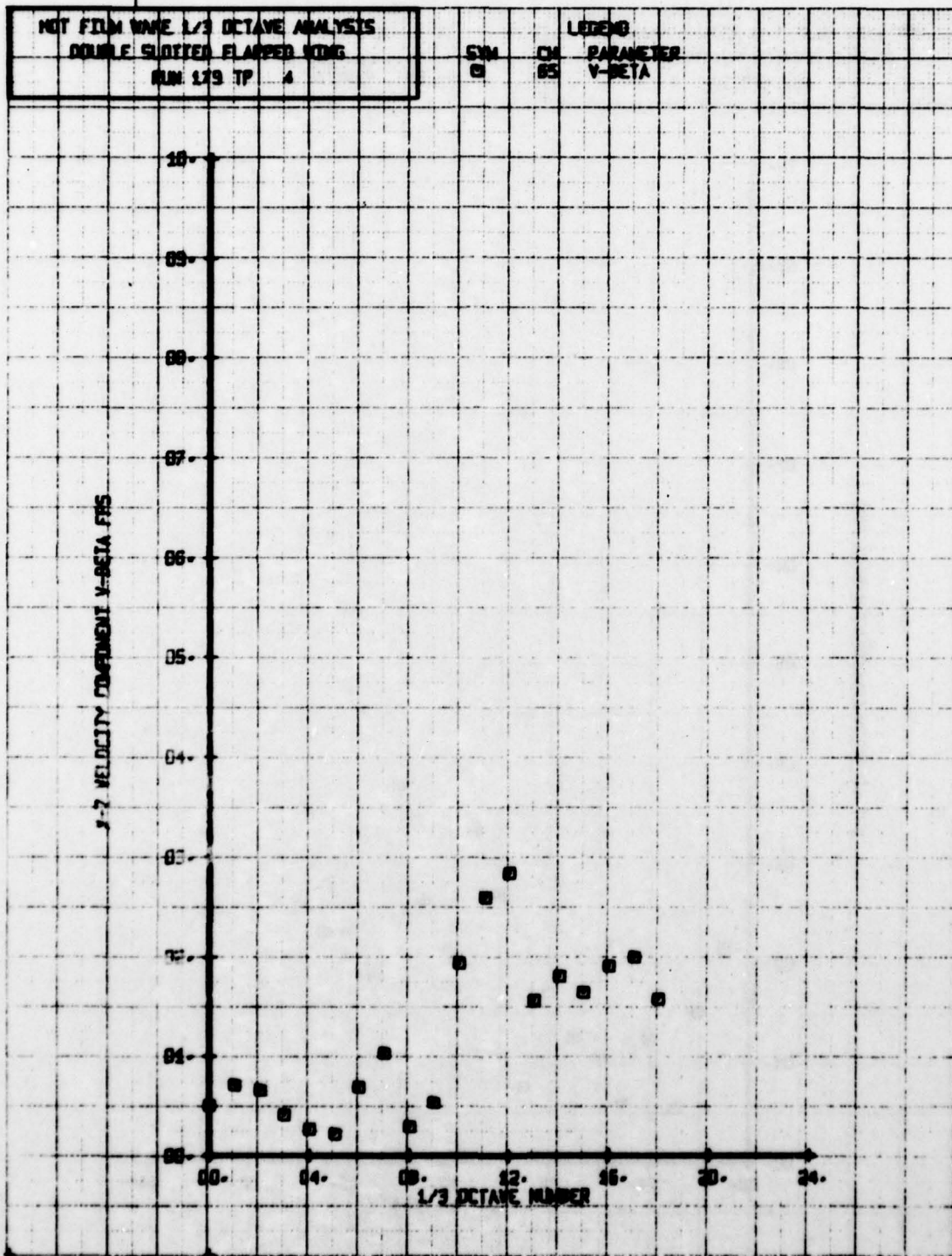
CH
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LEGEND
 PARAMETER
 V-BETA

X-2 VELOCITY COMPONENT V-BETA FPS



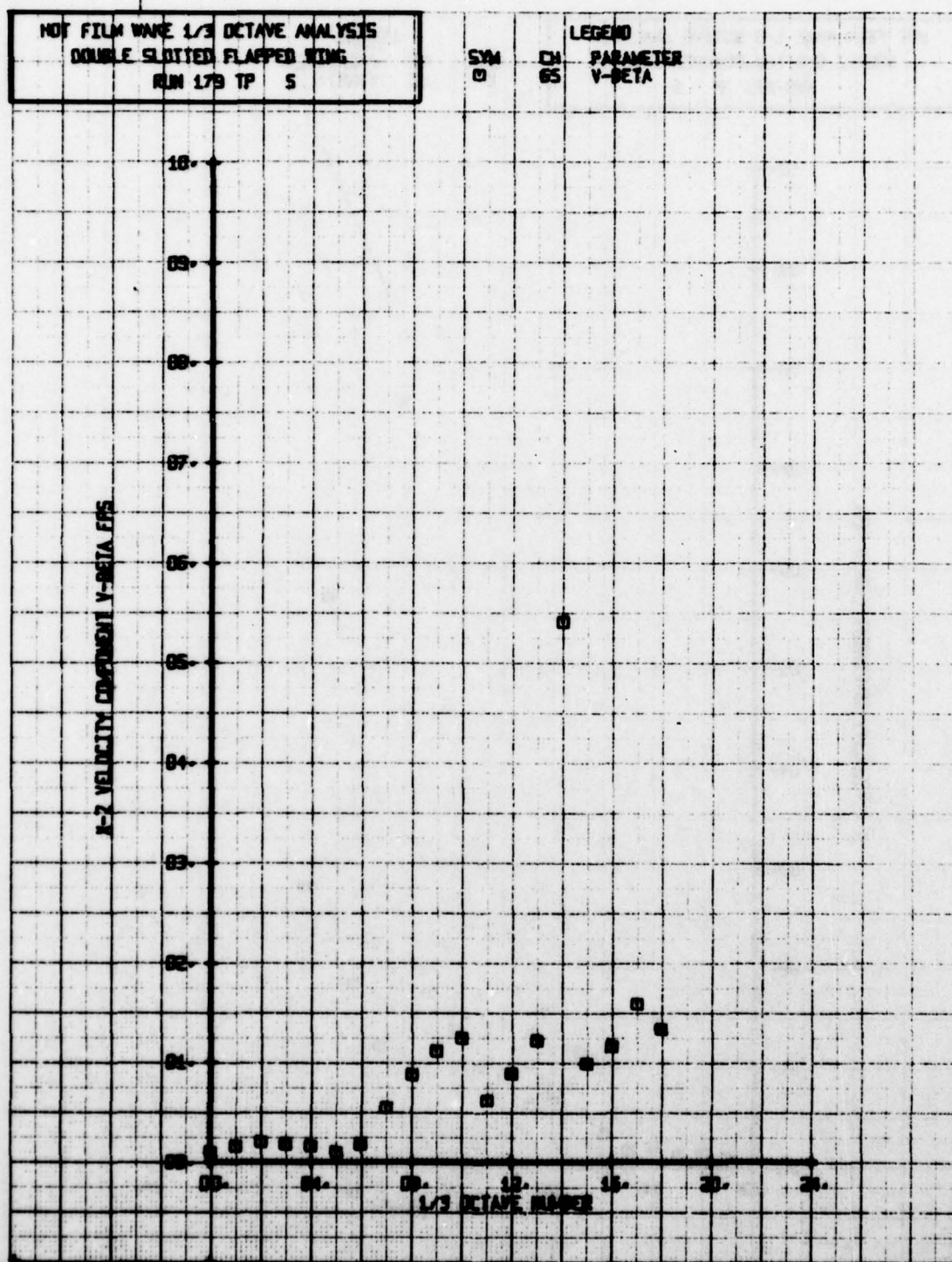


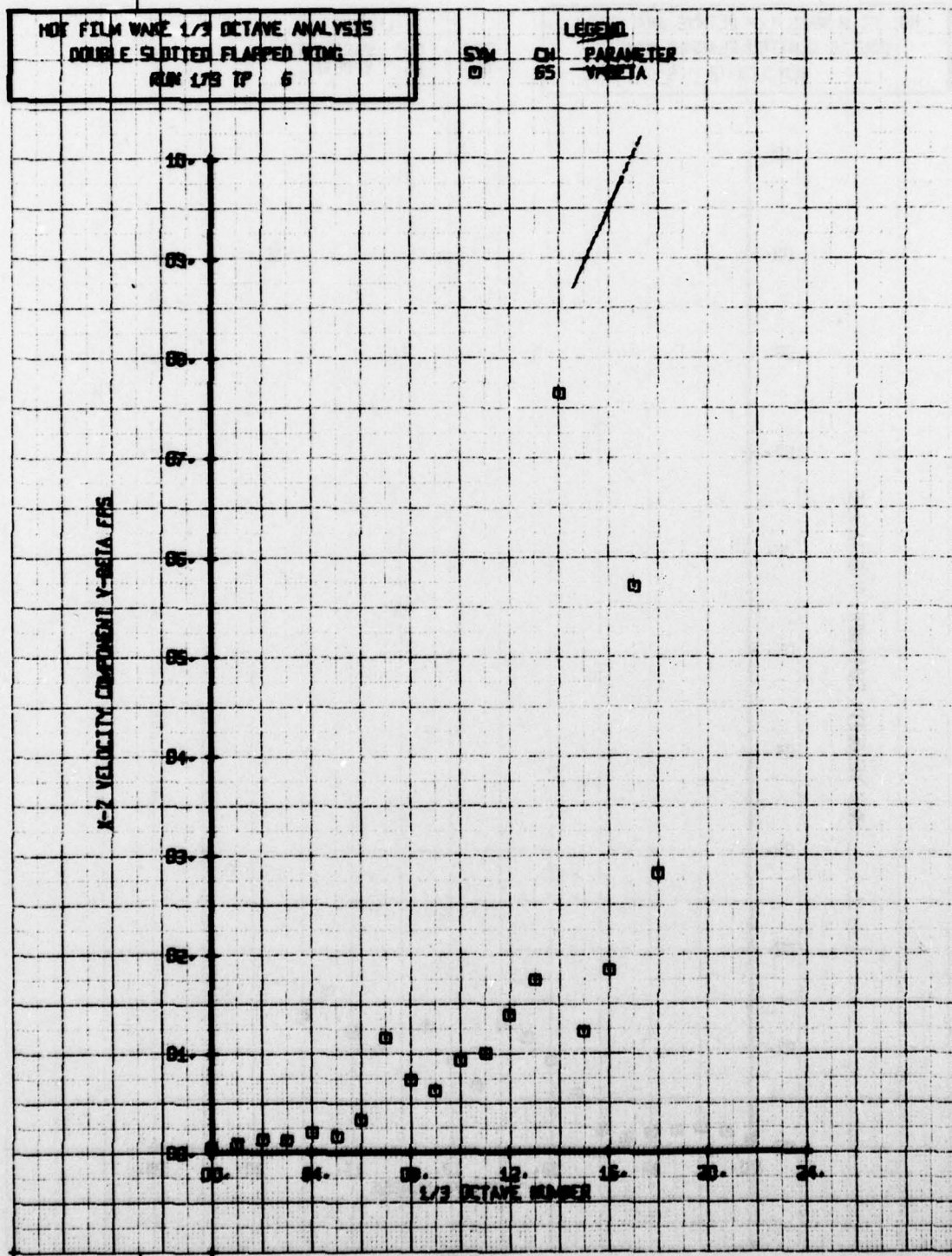


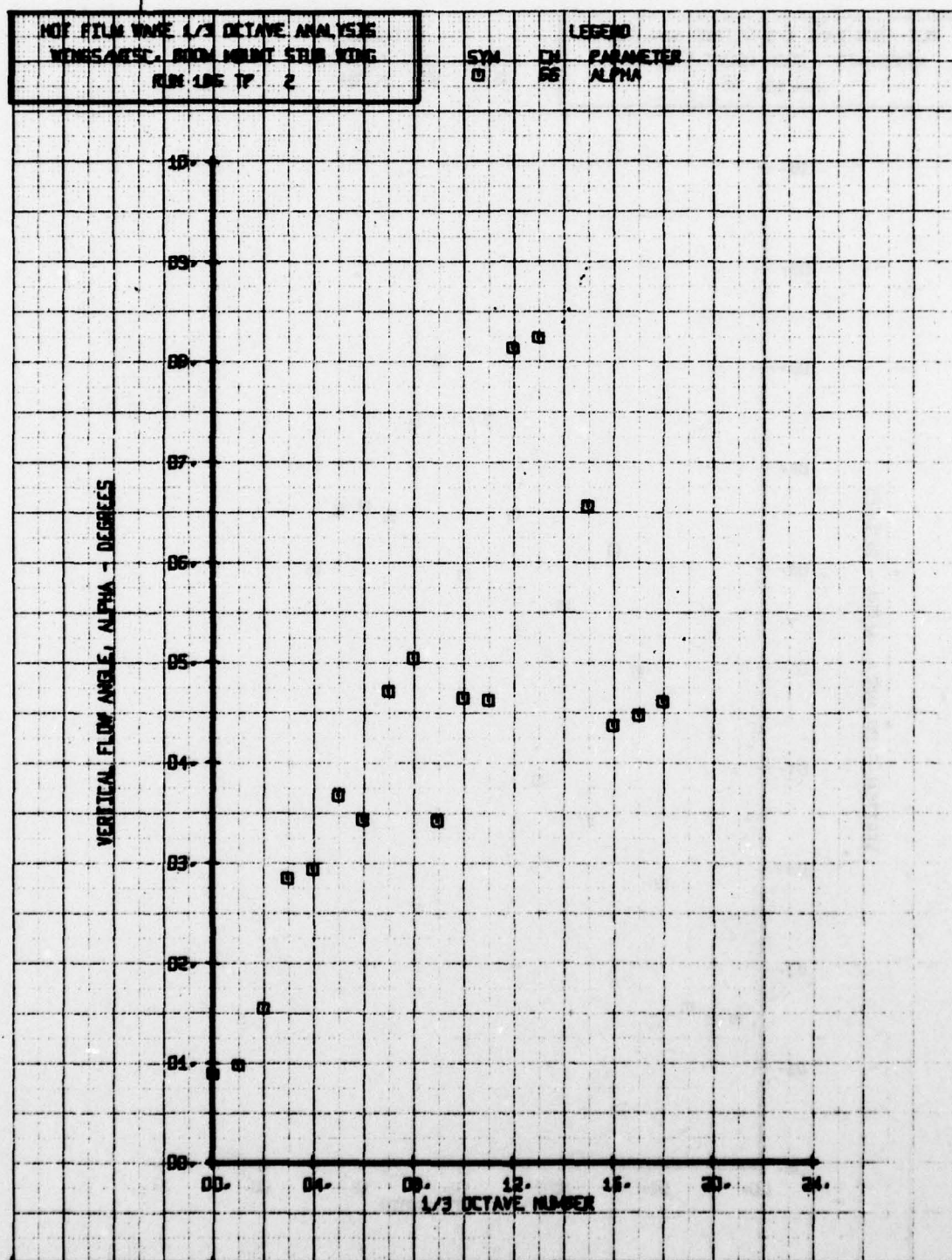
NOT FILM WAVE 1/3 OCTAVE ANALYSIS
 DOUBLE SLOTTED FLAPPED WING
 RUN 179 TP S

SYM
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LEGEND
 CH 65
 PARAMETER
 V-BETA





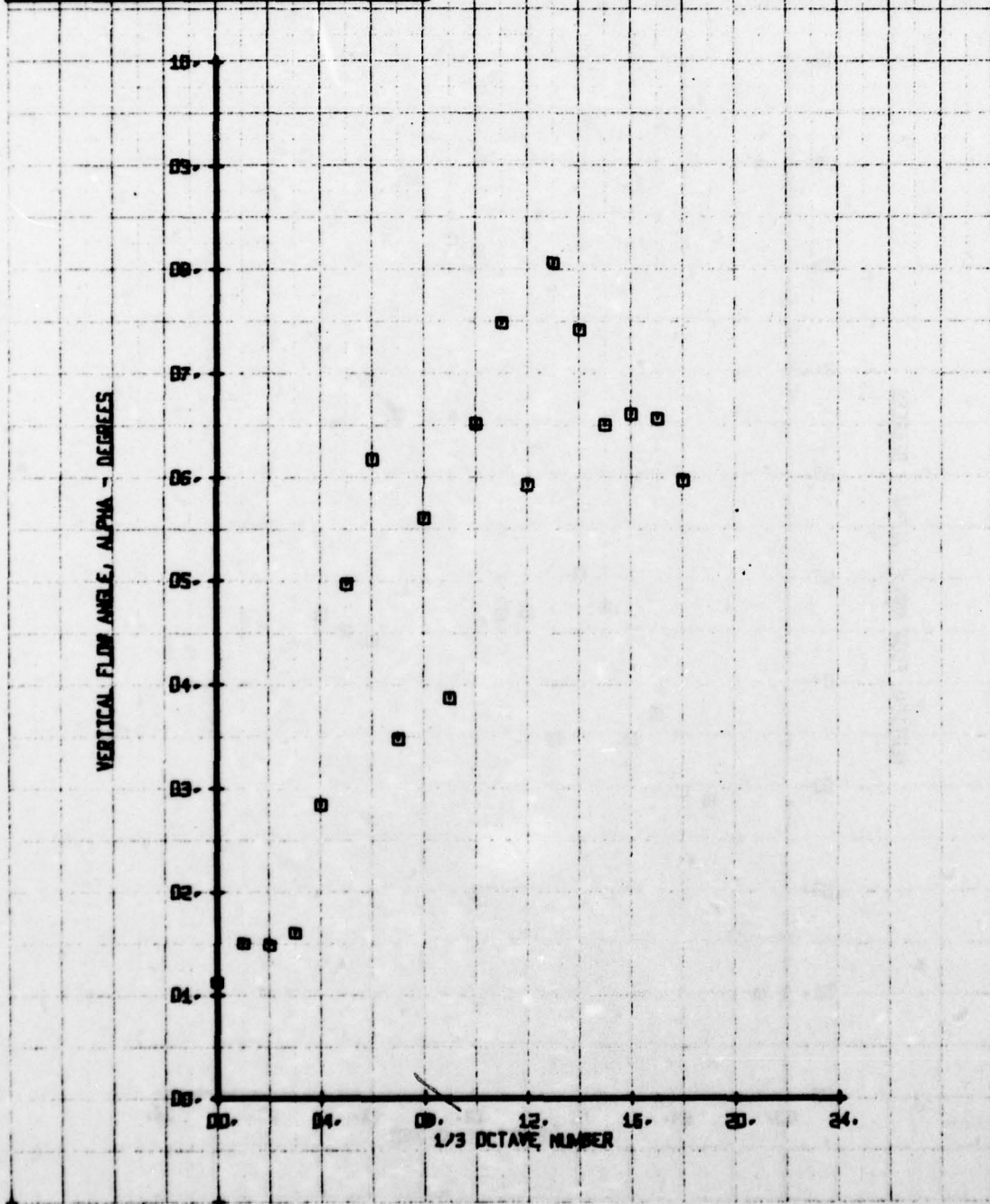


NOT FILM WAVE 1/3 OCTAVE ANALYSIS
 WINGS/MISC. ROOM MOUNT STUB WING
 RUN 106 TP 3

SYM
 0

CH
 66

LEGEND
 PARAMETER
 ALPHA

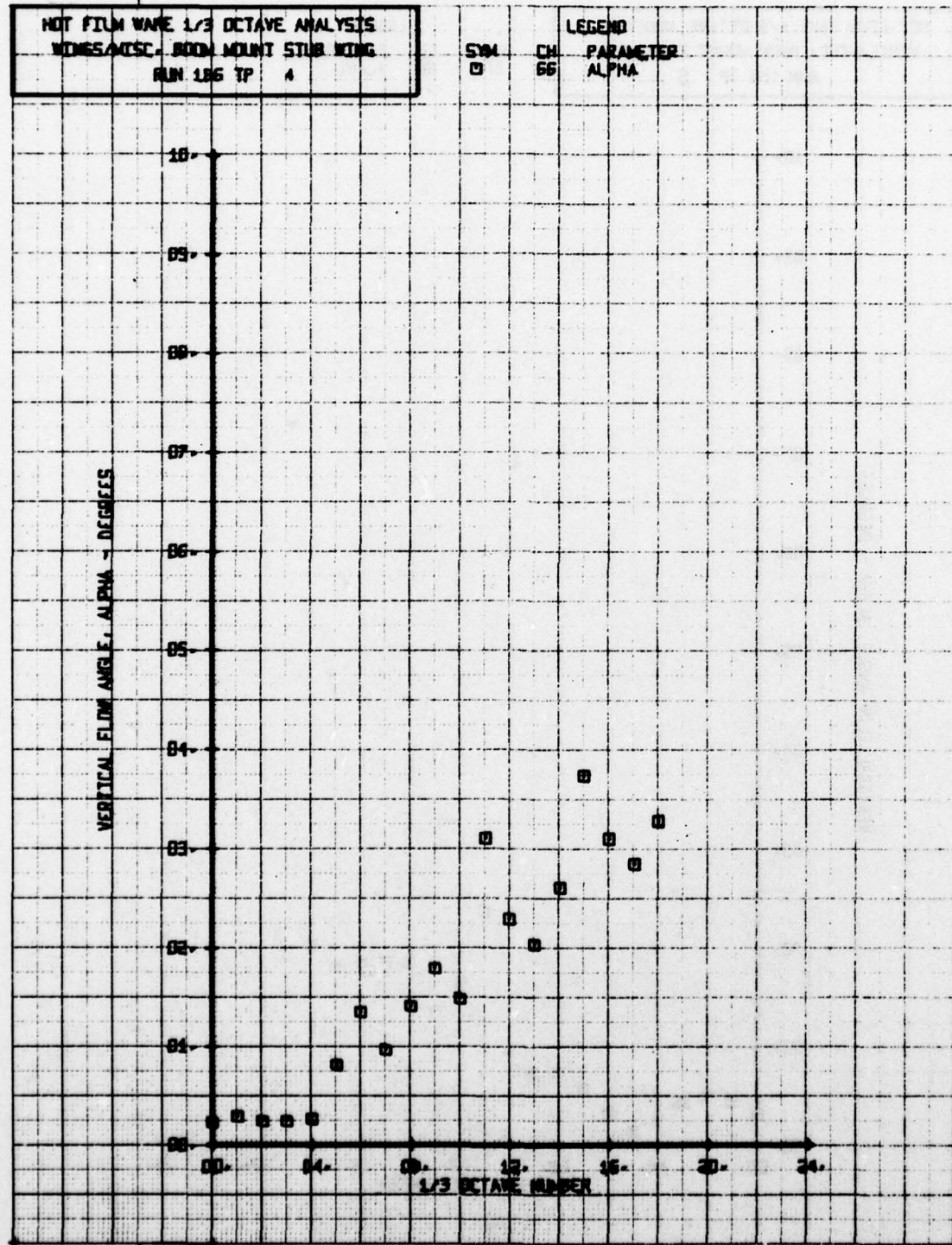


HOT FILM WARE 1/3 OCTAVE ANALYSIS
 WINGSPAN/OSC. ROOM MOUNT STUB WING
 RUN 186 TP 4

SYM
 □

CH
 66

LEGEND
 PARAMETER
 ALPHA



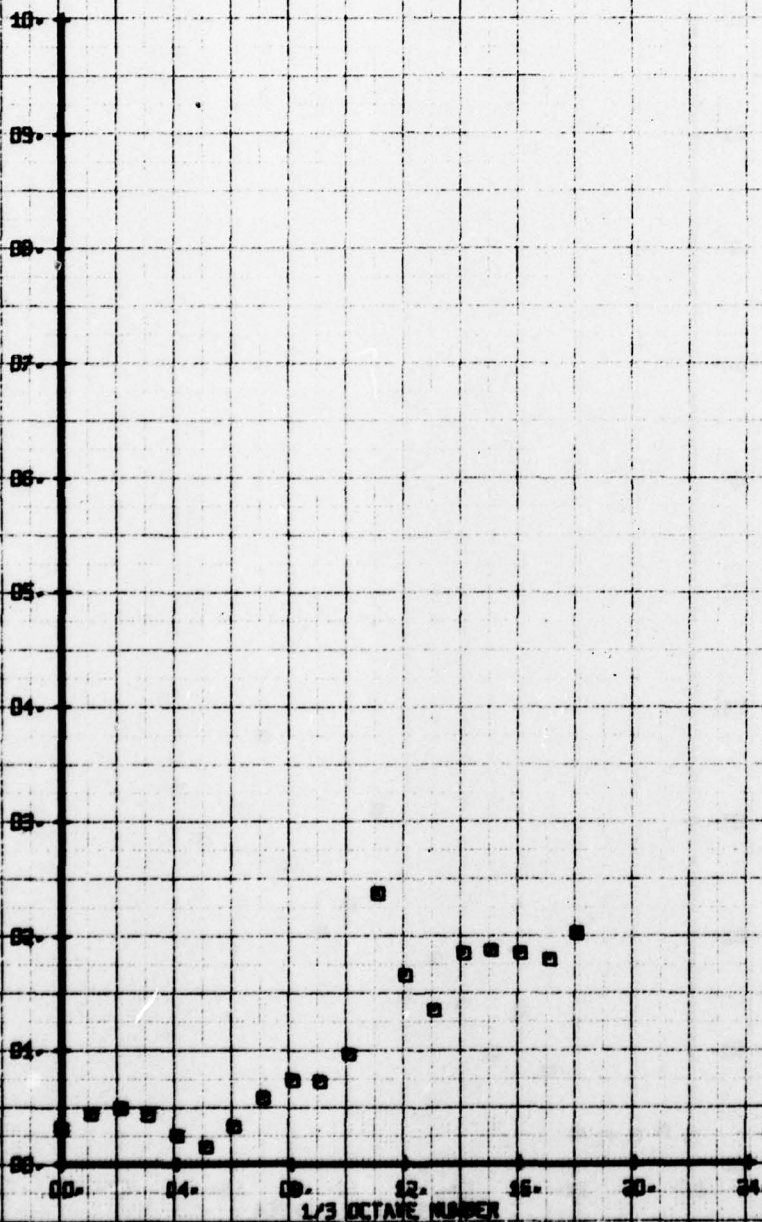
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 WINGS/TCSC BOOM MOUNT STDB WING
 RUN 186 TP 5

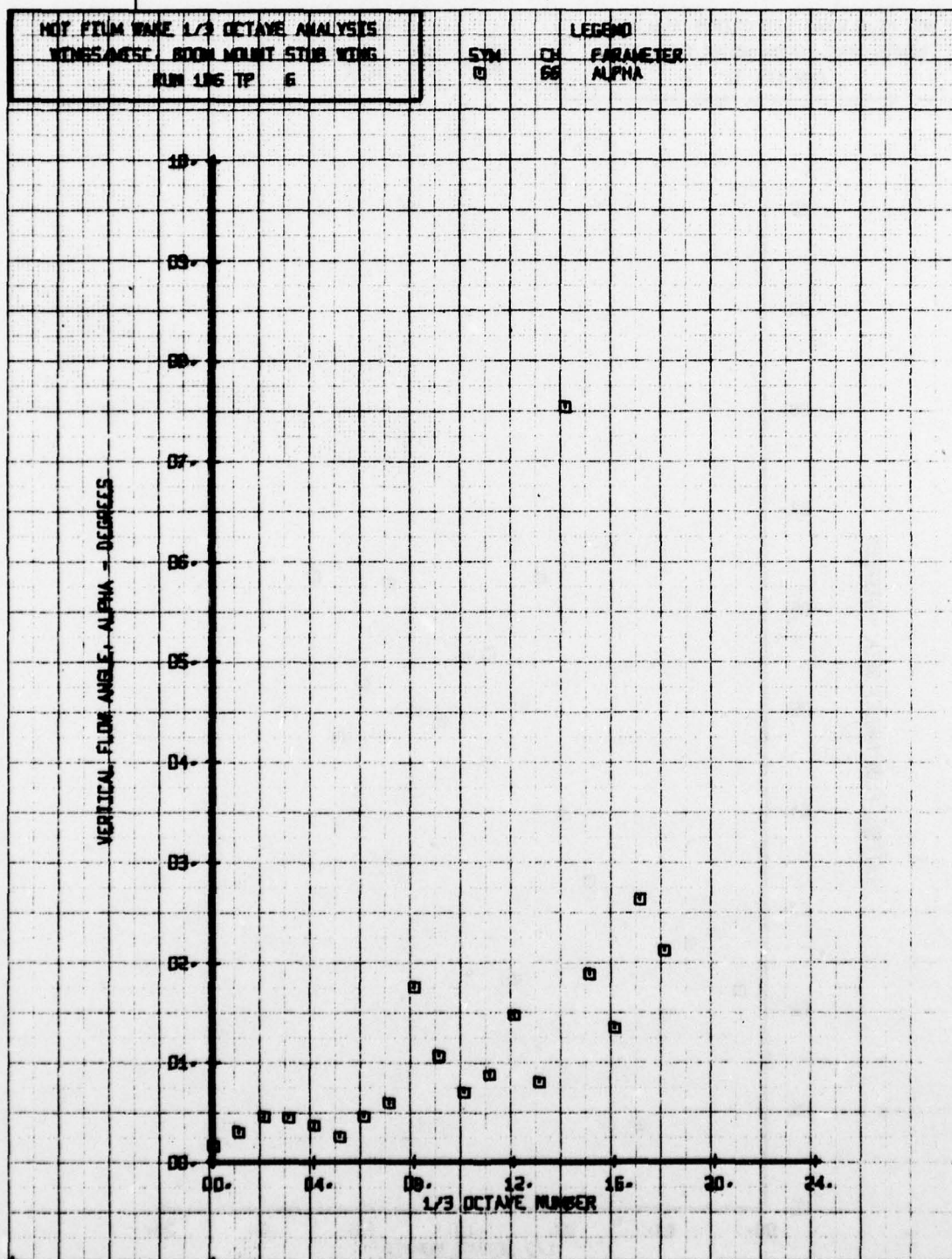
SYM
 □

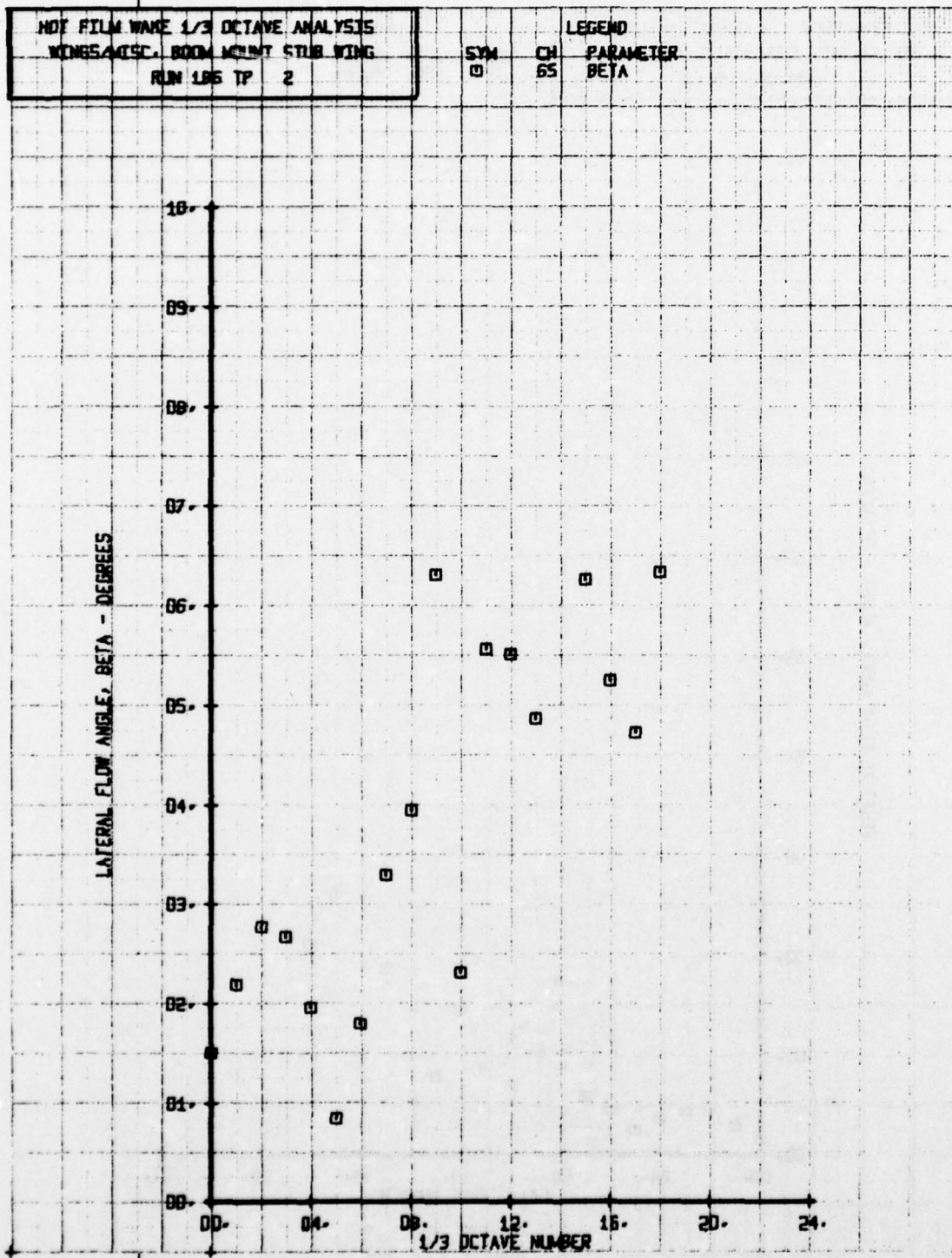
CH
 66

LEGEND
 PARAMETER
 ALPHA

VERTICAL FLOW ANGLE, ALPHA - DEGREES



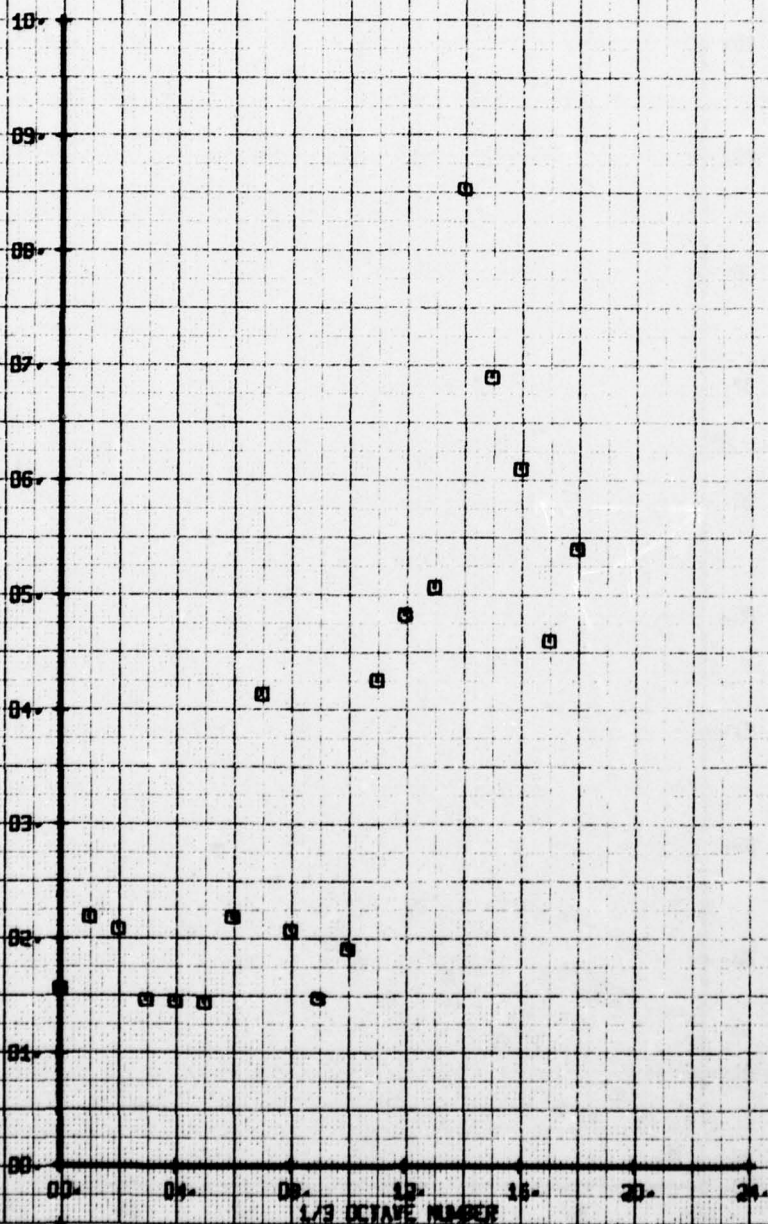




HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 WINGS/MISC. BOOM MOUNT STUB WING
 RUN 186 TP 3

SYM CH PARAMETER
 □ 65 BETA

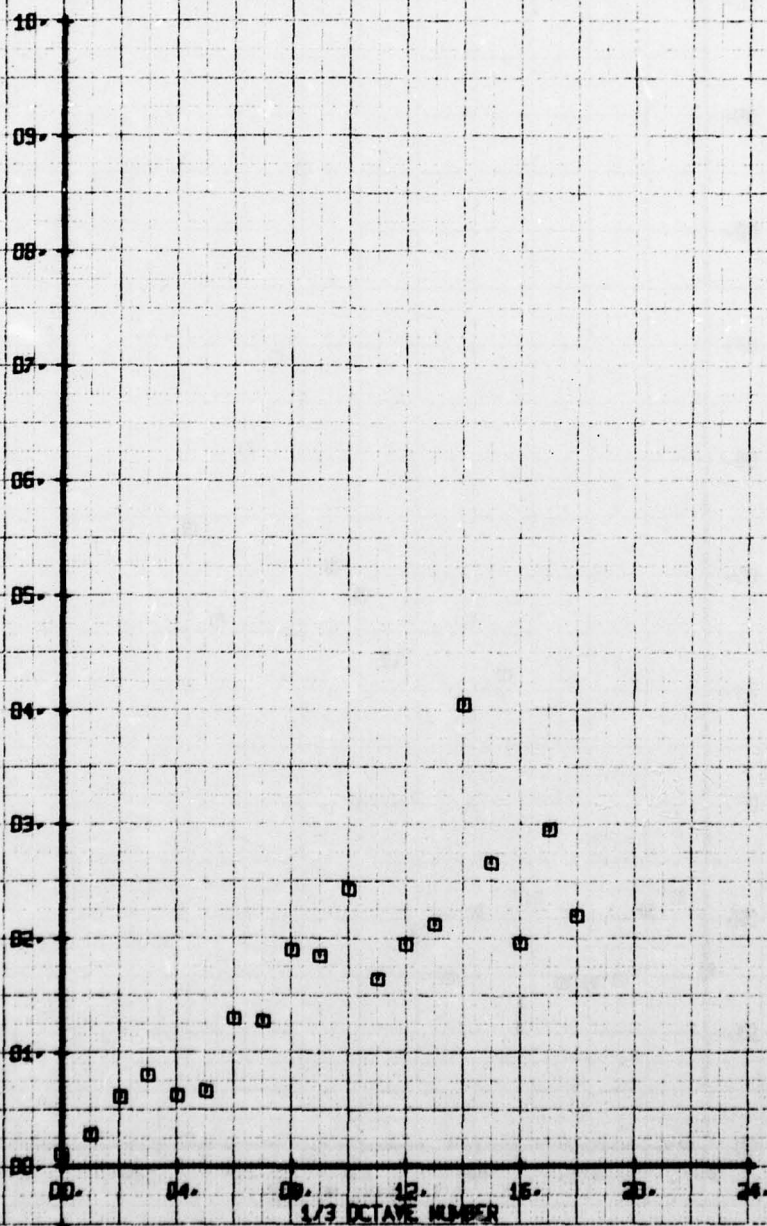
LATERAL FLOW ANGLE, BETA - DEGREES



HOT FILM WAVE 1/3 OCTAVE ANALYSIS
 WINGS/MISC. BOOM MOUNT STUB WING
 RUN 186 TP 4

SYM CH PARAMETER
 0 65 BETA

LATERAL FLOW ANGLE, BETA - DEGREES



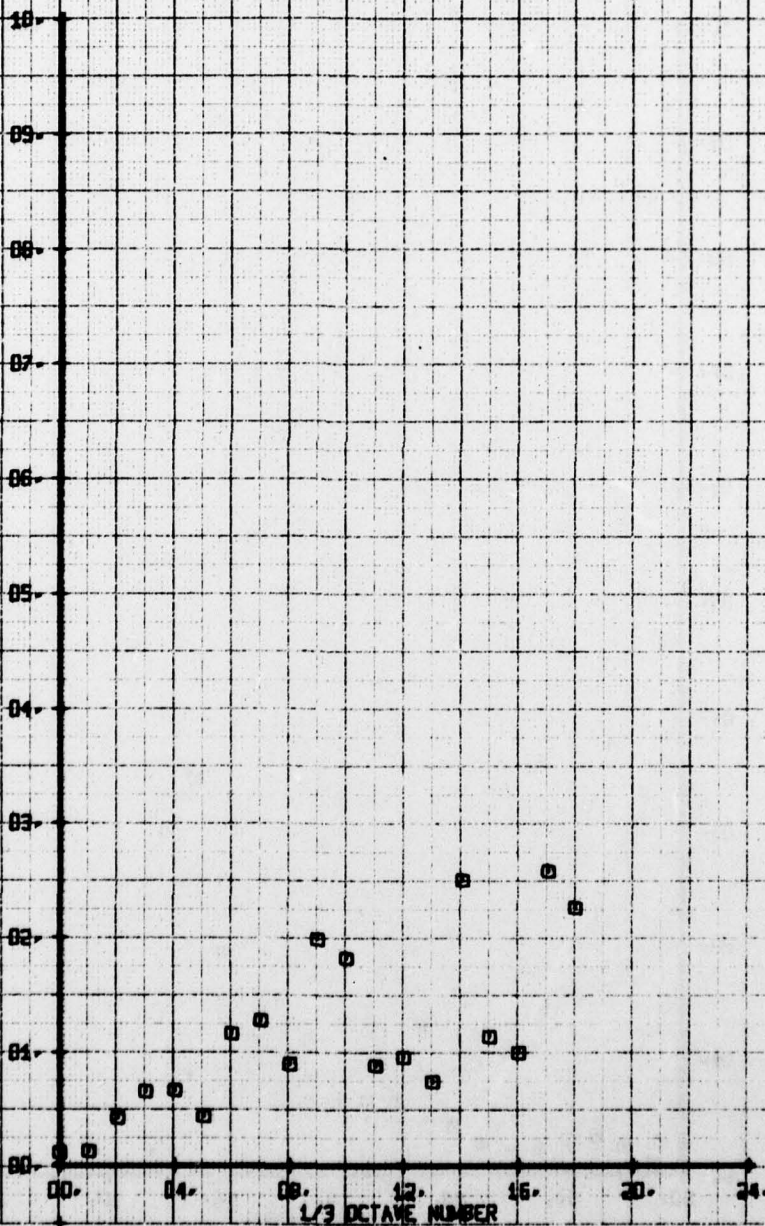
NET FILM WAVE 1/3 OCTAVE ANALYSIS
 WINDS/MISC. ROOM MOUNT STUB WING
 RUN 186 TP 5

SYM
 0

CH
 63

LEGEND
 PARAMETER
 BETA

LATERAL FLOW ANGLE, BETA - DEGREES



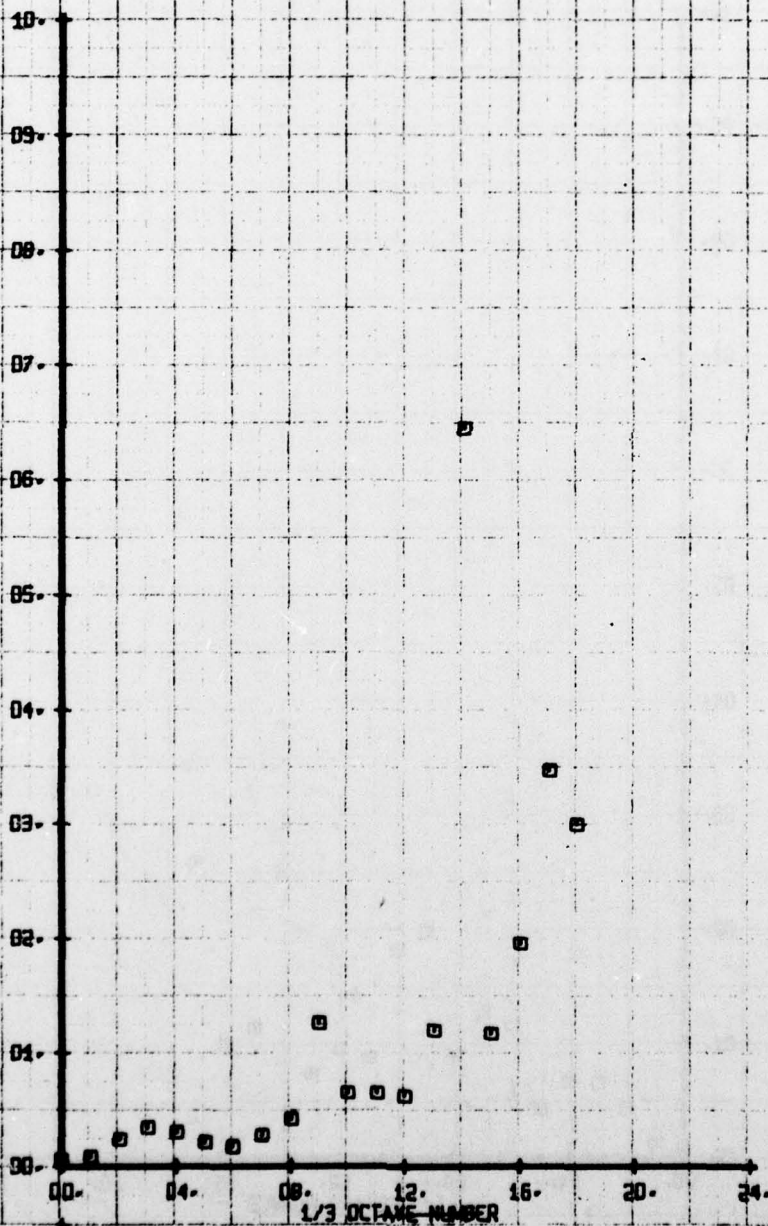
NOT FILM WAVE 1/3 OCTAVE ANALYSIS
 WINESATSC. ROOM MOUNT STUB WING
 RUN LOG TP 6

SYM
 0

CH
 65

LEGEND
 PARAMETER
 BETA

LATERAL FLOW ANGLE, BETA - DEGREES



NOT FILM WAKE 1/3 OCTAVE ANALYSIS
WINGS/MISC. BOOM MOUNT STUB WING

RUN 106 TP B

SYM
C

LEGEND

CH
65

PARAMETER
BETA

LATERAL FLOW ANGLE - BETA - DEGREES

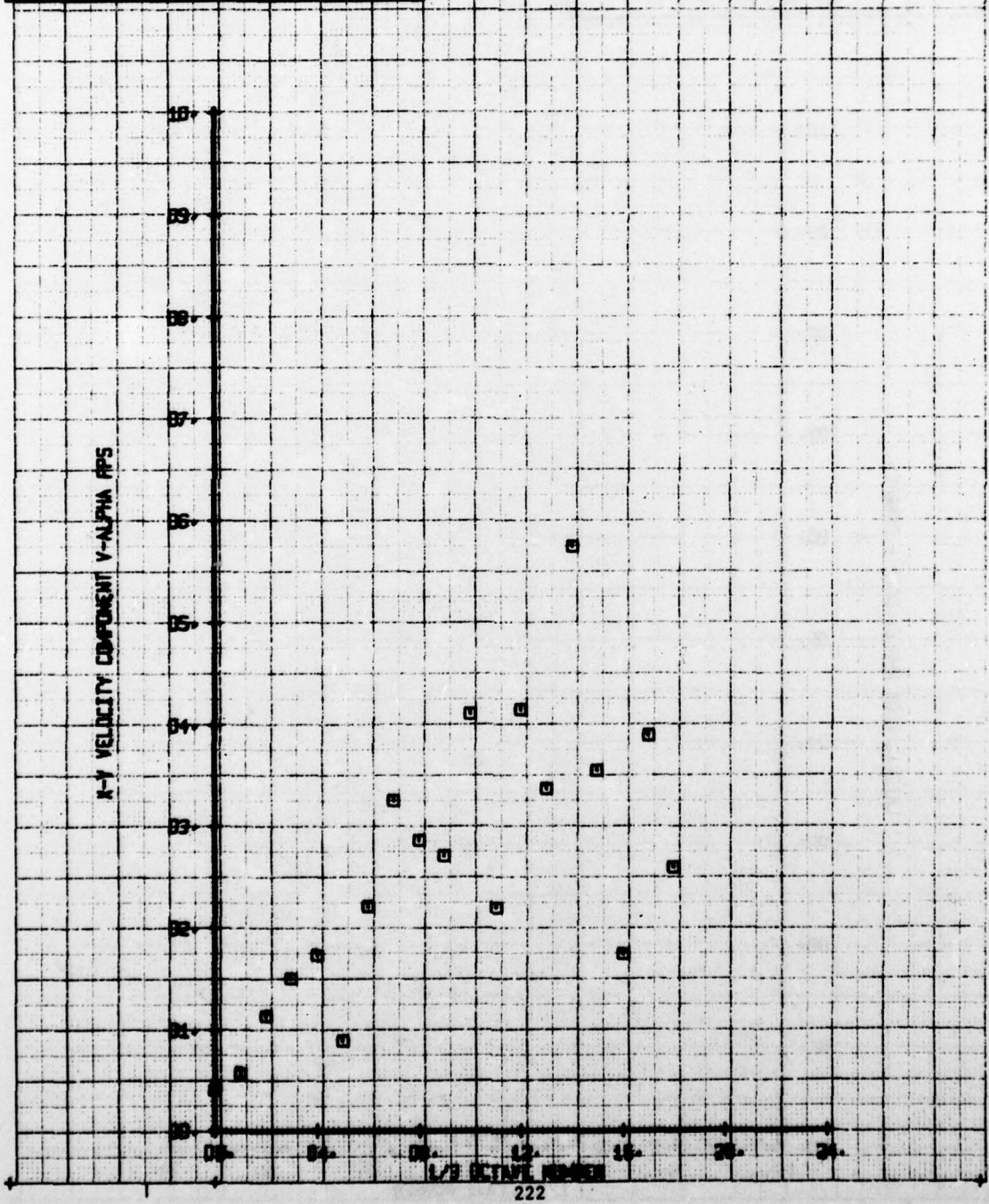
10.
09.
08.
07.
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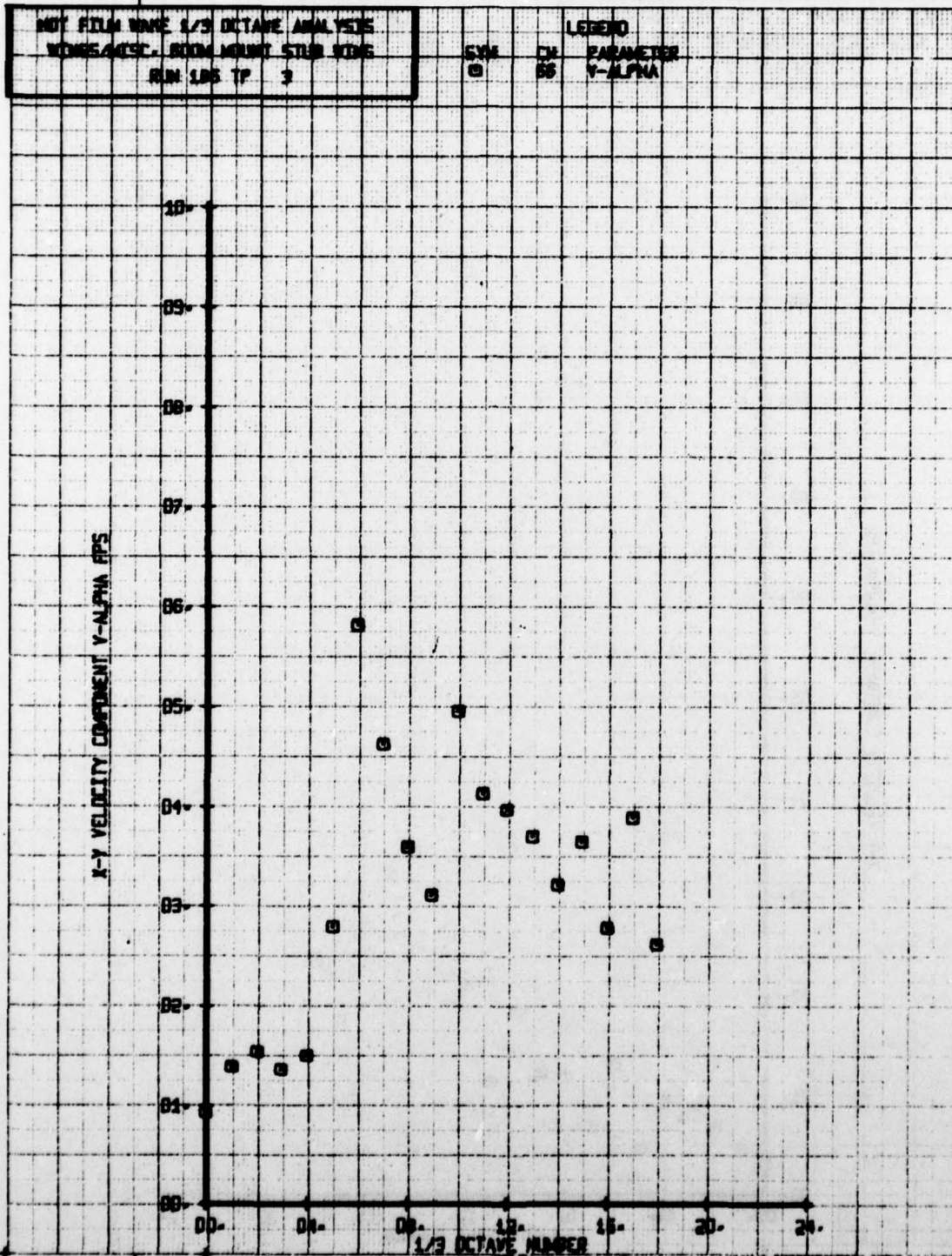
10. 12. 14. 16. 18. 20. 22.

1/3 OCTAVE NUMBER

HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 WINDS/SEC. ROOM MOUNT STUB WING
 RUN LBS TP 2

SYN CH
 0 66
 LEGEND
 PARAMETER
 V-ALPHA





NOT FILM WAKE 1/3 OCTAVE ANALYSIS
 WINGS/SEC. ROOM MOUNT STILL WING
 RUN 105 TP 4

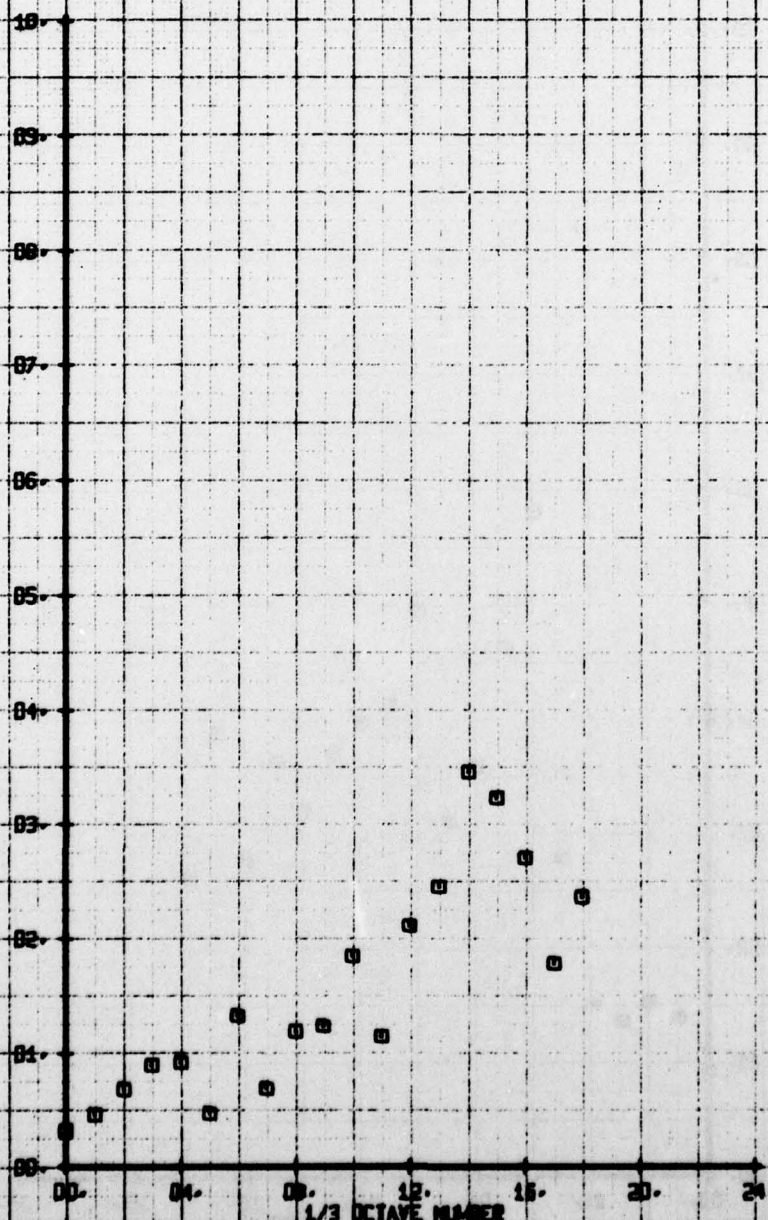
SYM
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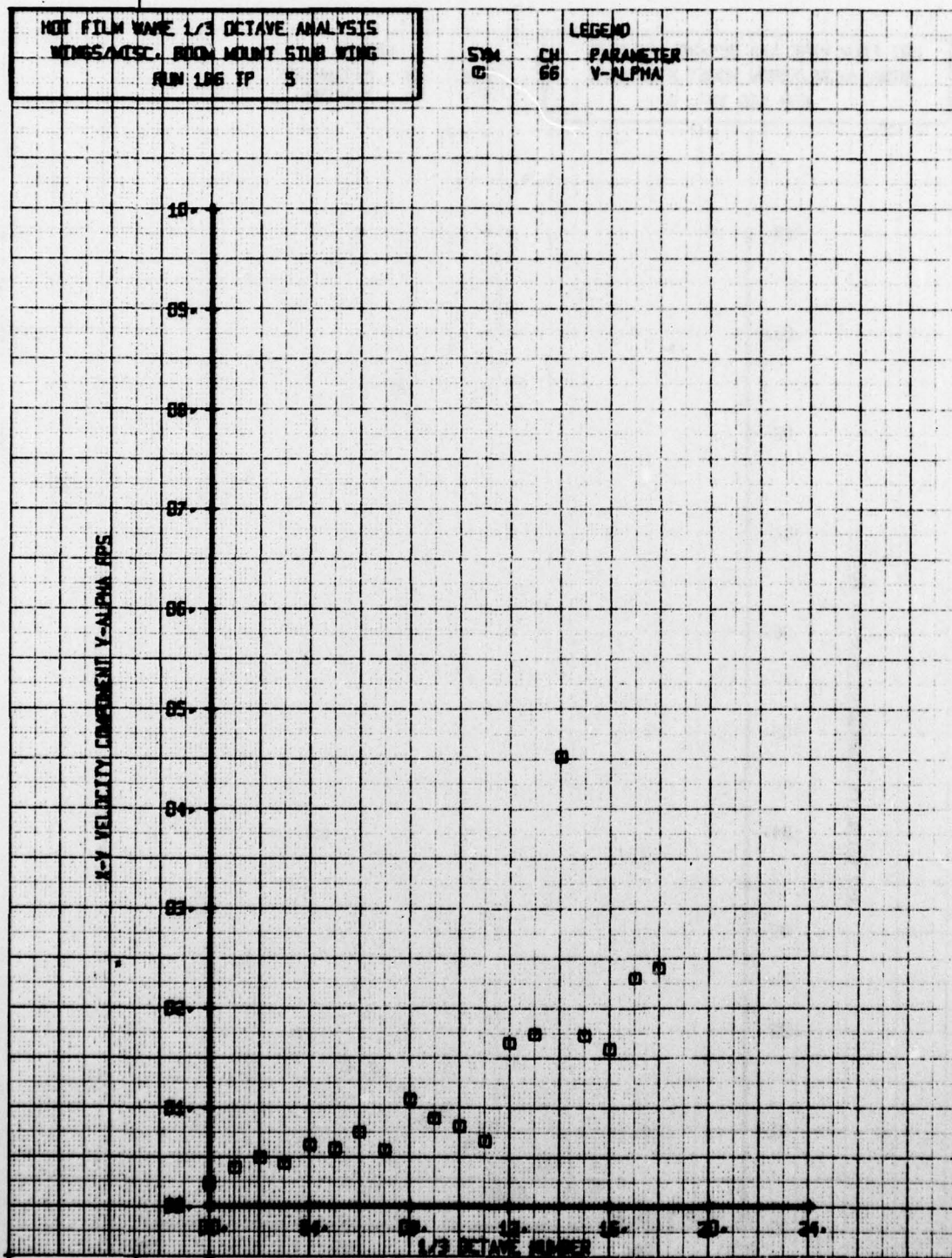
LEGEND

CH
 66

PARAMETER
 V-ALPHA

X-Y VELOCITY COMPONENT V-ALPHA FPS



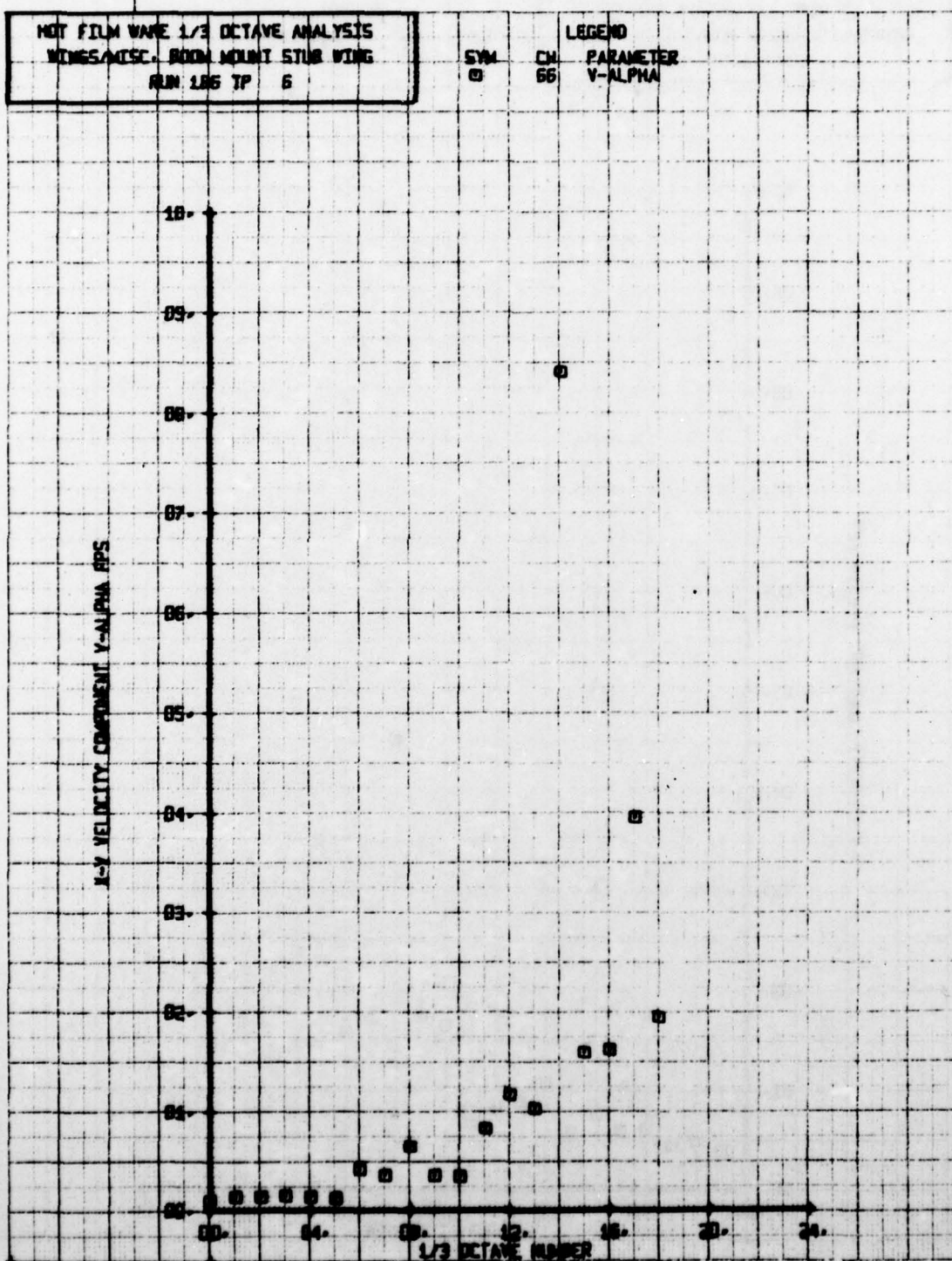


NOT FILM WAVE 1/3 OCTAVE ANALYSIS
 WINGS/MISC. ROOM MOUNT STUB WING
 RUN 186 TP 6

SYM
 0

CH
 66

LEGEND
 PARAMETER
 V-ALPHA



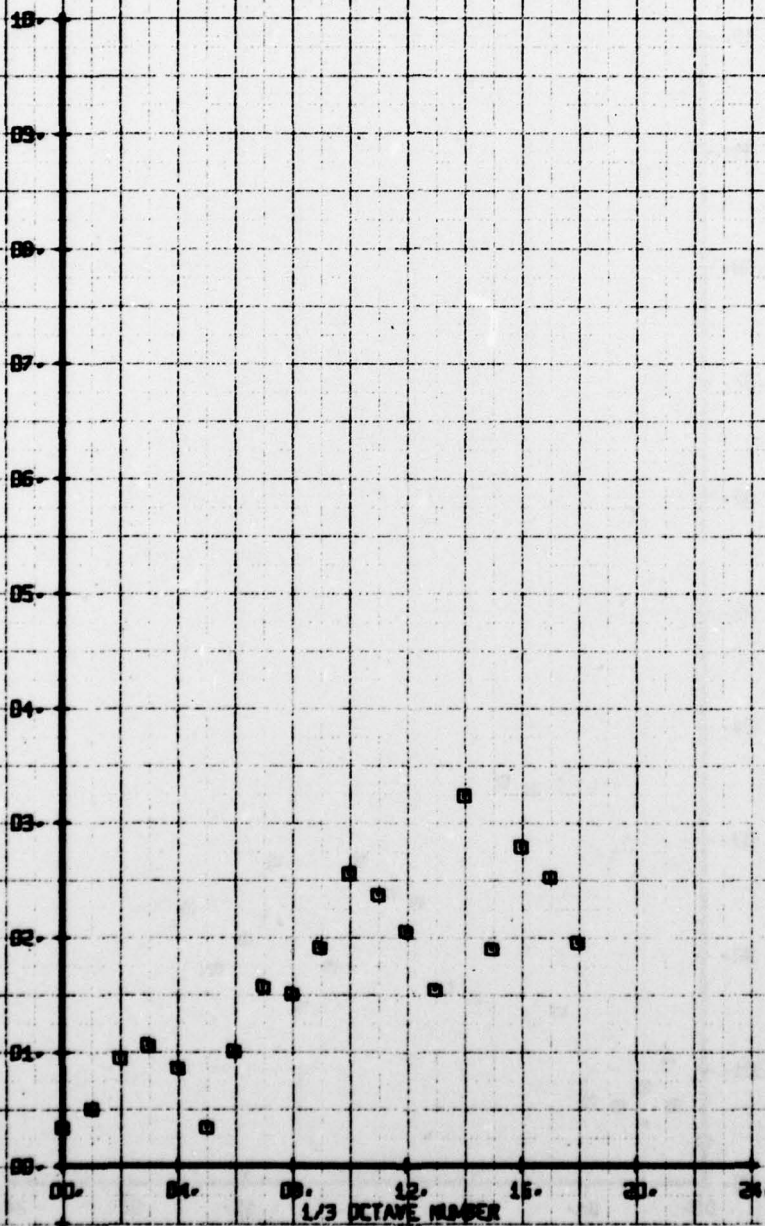
NOT FILM WAVE 1/3 OCTAVE ANALYSIS
 WINGS/MISC. ROOM MOUNT STIM WING
 RUN 106 TP 2

SYM
 0

CH
 05

LEGEND
 PARAMETER
 V-BETA

A-2 VELOCITY COMPONENT V-BETA FPS



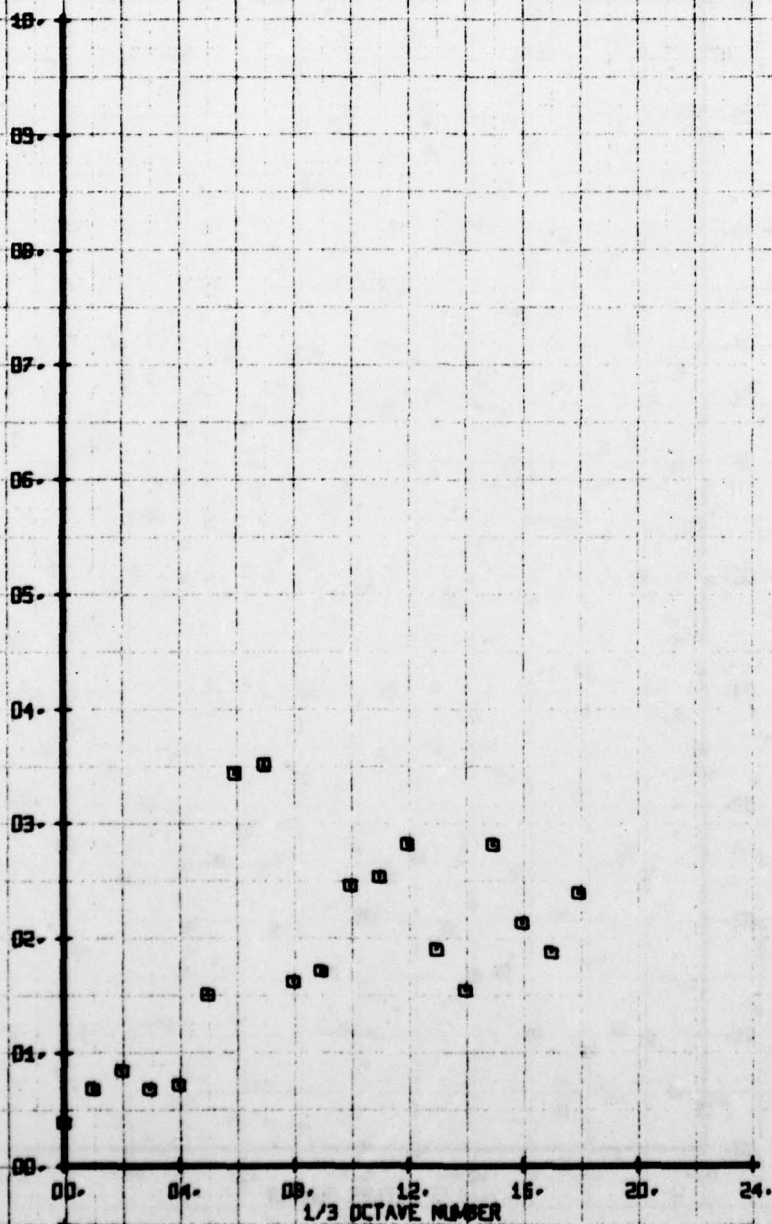
HOT FILM WIRE 1/3 OCTAVE ANALYSIS
 WINGS/MISC. ROOM MOUNT STILL WING
 RUN 105 TP 3

SYM
 □

CH
 65

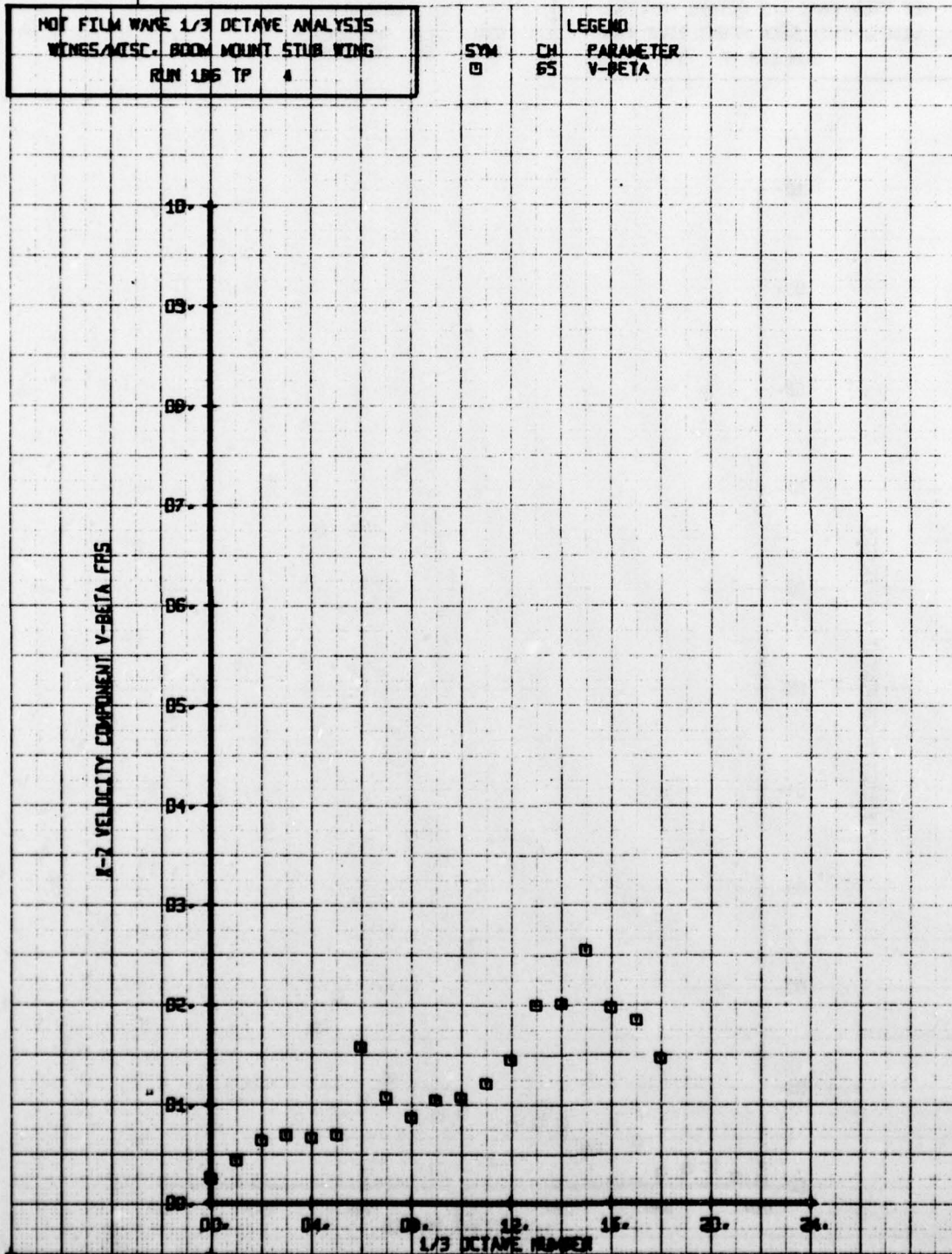
LEGEND
 PARAMETER
 V-BETA

X-Z VELOCITY COMPONENT V-BETA FPS



NOT FILM WAKE 1/3 OCTAVE ANALYSIS
 WINGS/ATSC. ROOM MOUNT STUB WING
 RUN 185 TP 4

SYM CH PARAMETER
 □ 65 V-BETA



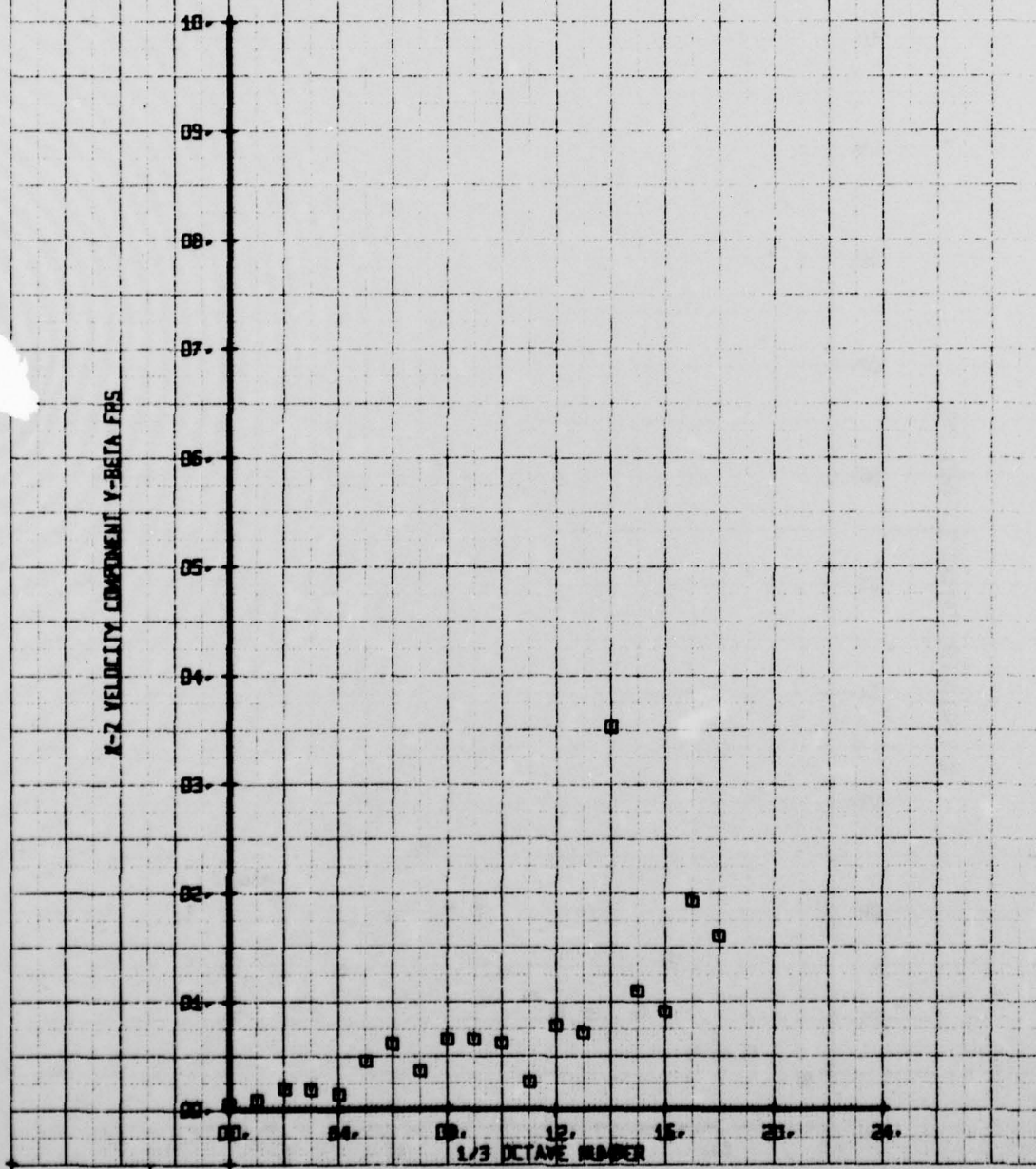
NOT FILM WAVE 1/3 OCTAVE ANALYSIS
 WINGS/MISC. BODY MOUNT STILL WING
 RUN 186 TP 5

SYM
 0

CH
 65

LEGEND
 PARAMETER
 V-BETA

A-2 VELOCITY COMPONENT V-BETA FBS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS
 WING/MISC. BOOM MOUNT STUB WING
 RUN 186 TP 5

SYM	CH	LEGEND
□	65	PARAMETER V-BETA

X-2 VELOCITY COMPONENT V-BETA FPS

